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USSR Report

EARTH SCIENCES

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**USSR REPORT
EARTH SCIENCES**

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METEOROLOGY

METEOROLOGICAL CENTER'S FORECASTS AID VENUS PROBE TRACKING

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Mar 85 p 3

[Article by M. Dmitruk]

[Abstract] On the occasion of World Meteorology Day, the article reports on severe-storm warning services provided by the USSR Hydrometeorological Scientific Research Center (Gidromettsentr). Warnings of hurricane-force winds, heavy precipitation, sharp temperature changes and other severe weather are furnished by the center to many organizations.

O. Belinskiy, head of the center's Department of Forecasts of Severe Weather Phenomena, reported that weather maps are now prepared with the aid of computers that perform 1.5 million operations a second. The center's severe-storm forecasts are said to be about 90 percent accurate, on the average. Belinskiy mentioned that the center plans to acquire a computer with a much larger capacity soon. It will make it possible to heighten the accuracy and usefulness of information on severe weather phenomena.

Testimonials from users of the storm warning service are quoted in the article. A letter from A. Bogomolov, corresponding member of the USSR Academy of Sciences, praised forecasts which have helped his group in operating the 64-meter dish antenna of a radio telescope near Moscow. Accurate forecasts of strong winds over a period of eight months permitted trouble-free receptions by the antenna of singlas from automatic interplanetary stations which are orbiting Venus.

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DIAGNOSIS OF 'WEATHER STATES' IN WINTER OF 1980-1981

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 20, No 11, Nov 84 (manuscript received 23 Jul 84) pp 1011-1016

KURBATKIN, G. P., USSR Hydrometeorological Center

[Abstract] Using maps of winter weather states for December 1980 through February 1981 for the Rocky Mountains and Gulf of Alaska, a diagnostic study is presented of the complex nonlinear mechanisms by which bottom boundary conditions influence changes in atmosphere circulation. The weather states for December and for January are found to differ significantly. The diagnostic estimates produced show that nonadiabatic processes changing global atmospheric circulation are related to unsteady fluctuations in atmospheric dynamics and are themselves unsteady. The task of modeling and predicting changes in such quasisteady "weather states" is quite complex. Heat fluxes should be studied both by mathematical modeling and by direct measurement. Figures 3; references 4: 1 Russian, 3 Western.

[182-6508]

UDC: 551.583.1

MAIN PROBLEMS IN CLIMATE MONITORING (DIAGNOSIS)

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA
in Russian Vol 20, No 11, Nov 84 (manuscript received 26 Jun 84) pp 1017-1026

GRUZA, G. V., RUBINSHTEYN, K. G., BIRMAN, B. A. and RAZUVAYEV, V. N.,
USSR Hydrometeorological Center

[Abstract] Climatic monitoring refers to an independent area of climatology studying the problems involved in changes of climate in combination with all other changes occurring in the environment. It involves monitoring of the status of the climatic system, determination of the degree of its anomaly and possible causes for the anomaly, as well as the scale of probable results. Climatic monitoring requires the creation of a well-founded system with modern hardware for observing the status of the environment, transmission, analysis and storage of information. The object of monitoring must be climatic fluctuations over time scales from one month to several decades. The spatial scale varies from local to global. An organization of the monitoring system for the USSR is suggested, and it is noted that a number of scientific problems remain to be solved. Climatic monitoring is an international problem, and must involve a number of governmental departments in the USSR. Figures 2; tables 3; references 8: 7 Russian, 1 Western.

[182-6508]

UDC: 551.582.15

USE OF METHOD OF CANONICAL CORRELATIONS FOR ANALYSIS OF CLIMATIC SERIES

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 20, No 11, Nov 84 (manuscript received 8 Feb 84) pp 1027-1034

TATARSKAYA, M. S. and FORTUS, M. I., Atmospheric Physics Institute, USSR
Academy of Sciences

[Abstract] A study was made of the application of the canonical correlations method to problems of statistical climate prediction. In addition to the simple problem of predicting the value of a climatic series for a given moment in the future, the method is also applicable to the task of finding functions of future values which are predicted on the basis of past values with minimal error. The method was first applied to meteorology in 1967 by L. S. Gandin, who studied the statistical relationship between mean monthly water temperature in the North Atlantic and the mean monthly air temperature over the European USSR in December. Subsequent studies have demonstrated that application of the method for actual climatic series allows determination of optimal predicted values. The accuracy of prediction of values in some cases, such as in the prediction of mean annual temperature values in the 30-80°N latitude zone, can be significantly greater than the prediction of actual values in the series. Figures 2; tables 4;
references 14: 11 Russian, 3 Western.

[182-6508]

UDC: 551.463.6:551.511:551.576

EMPIRICAL ANALYSIS OF DIRECT AND INVERSE RELATIONSHIPS BETWEEN MACROSCALE CHARACTERISTICS OF ATMOSPHERIC PROCESSES IN NORTHERN HEMISPHERE AND THERMAL STATE OF NORTH ATLANTIC

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 20, No 11, Nov 84 (manuscript received 18 Jul 84) pp 1035-1041

YUDIN, M. I., MIRVIS, V. M. and CHUVASHINA, I. Ye., Main Geophysical Observatory

[Abstract] New empirical data are presented on direct and inverse relationships in the ocean-atmosphere system. The data are summarized and it is demonstrated that the hypothesis that there are a number sequences of direct and inverse relationships and self-oscillating processes is confirmed at a rather high significance level. The authors do not propose cause-and-effect relationships at the present time. The initial data used in the study consisted of monthly values of changes in heat content in the upper 100-meter water layer in the North Atlantic between 1949 and 1982. The

relationship of cloud cover and the thermal state of the ocean was also analyzed. The statistical analysis reveals a number of cyclic processes in the ocean-atmosphere system, as well as chains of direct and inverse relationships. Cold-season North Atlantic heat content anomalies are significant for subsequent development of large-scale atmospheric processes, which in turn cause disturbances in the thermal state of the ocean. Figures 4; tables 1; references 15: 13 Russian, 2 Western.

[182-6508]

UDC: 551.587:510.42

ATMOSPHERIC AEROSOL AND ITS EFFECTS ON CLIMATE

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 20, No 11, Nov 84 (manuscript received 25 Jun 84) pp 1055-1063

KONDRAT'YEV, K. Ya. and PROKOF'YEV, M. A., Limnology Institute, USSR
Academy of Sciences; Main Geophysical Observatory

[Abstract] This literature review discusses the influence of atmospheric aerosol on climate. A number of field studies of the past 10 to 15 years have discussed the importance of the contribution of aerosol-radiation effects to the energy budget of the atmosphere. Many authors have reported that large-scale systematic dust episodes in the troposphere can be related to deserts and volcanic phenomena. Considerable attention has been given to formulation of models of the radiation and microphysical properties of aerosol. A distinction must be drawn between the climatic effects of tropospheric and stratospheric aerosols. As yet, the calculated climatic effect of aerosols have not been compared with actual observed effects. Major trends are noted for studies of the climatic effect of aerosols: development of a realistic aerosol model for climate sensitivity studies; comparison of existing radiation transfer models which take aerosol effects into account; inclusion of radiation transfer parameters in the atmosphere with the aerosol in climatic models; and determination of global aerosol types necessary for climatic modeling by means of model experiments. References 68: 15 Russian, 53 Western.

[182-6508]

UDC: 551.510.41

CLIMATICALLY ACTIVE TRACE GASES IN ATMOSPHERE

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA
in Russian Vol 20, No 11, Nov 84 (manuscript received 22 May 84) pp 1064-1074

KAROL', I. L., Main Geophysical Observatory

[Abstract] A discussion of the results of a number of Soviet and foreign studies conducted up to early 1984 is presented. Characteristics of trace gas cycles are refined, both those observed and those expected in the future. Methods of execution and results of model estimates of these changes of radiation fluxes and climate on a global scale are described. Estimates for changes in global trace gas content anticipated by the year 2000 are presented and the greenhouse effect is predicted on the basis of models of development of the world economy and extrapolation of current trends. The system of interactions among photochemical processes, radiation, temperature and heat transfer is modeled. Photochemical processes in the troposphere and stratosphere primarily increase the greenhouse effect with an increase in content of trace gases in the atmosphere. Methane, NO_x, ozone and chlorofluorohydrocarbons are included in the analysis. Figures 6, tables 3; references 26: 7 Russian, 19 Western.

[182-6508]

UDC: 551.510.42:551.521.31

ESTIMATE OF RADIATION-CLIMATIC EFFECTS OF NATURAL AND ANTHROPOGENIC AEROSOL

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 20, No 11, Nov 84 (manuscript received 13 Jun 84) pp 1075-1080

MANUYLOVA, N. I., PETUKHOV, V. K., TARASOVA, T. A. and FEYGEL'SON, Ye. M.,
Atmospheric Physics Institute, USSR Academy of Sciences

[Abstract] Major results from 5 previous studies involving investigation and parameterization of the radiation aerosol effect are presented briefly. The effects of scattering and absorption are analyzed separately. Radiation effects of aerosol lead to changes in the albedo and absorptive capacity of the climatic system, resulting in restructuring of its dynamic parameters. The change in mean global albedo of the system is estimated for aerosols of varying optical thickness and absorptive capacity. The absorptive capacity is the major climate-forming parameter of aerosol, along with the number and size of aerosol particles. The aerosol significantly influences the temperature status of the climatic system primarily through direct changes in system albedo, to a lesser extent by the restructuring of the system caused by the aerosol. Figures 3; tables 2; references 11: 8 Russian, 3 Western.
[182-6508]

UDC: 551.588.7:621.31

INFLUENCE OF POWER ENGINEERING ON CLIMATE

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 20, No 11, Nov 84 (manuscript received 21 Jun 84) pp 1089-1103

LEGASOV, V. A., KUZ'MIN, I. I. and CHERNOPLEKOV, A. N., Nuclear Energy
Institute imeni I. V. Kurchatov

[Abstract] A study is made of the influence of power production on changes in global climate in order to estimate the effect of this factor over the long term both on possible limitations in the increase in power consumption and on the structure and fuel power balance. The article is essentially a review of the rather contradictory literature on the subject, with an emphasis on later works assisting interpretation of earlier studies. Based on estimates obtained of the scale of the effect of powerplants on climate and the possible nature of these effects, power engineering is determined to be a significant climate-altering factor, requiring consideration of climatic effects in determining power development strategies. The ecological aspects of the problem of safe development of power engineering must include determination of the effectiveness of appropriations for protection of the earth from the danger from possible climatic change. The problem of defining quantitative indices reflecting changes in climate with sufficient accuracy is therefore a major one. Figures 5; references 48: 22 Russian, 26 Western.
[182-6508]

UDC 551.58:551:338.45

RECENT CHANGES IN CLIMATE AND WORLD WATER BALANCE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOGRAFICHESKAYA in Russian
No 1, Jan-Feb 85 (manuscript received 30 Dec 83) pp 31-38

DOBROVOL'SKIY, S. G. and KLINGE, R. K., Water Problems Institute, USSR
Academy of Sciences

[Abstract] Over the course of some decades water exchange between the ocean and the landmasses free of continental glaciation occurs by means of fluxes of moisture whose deviations from the mean in individual years are not dependent on one another and which are only slightly related to changes in the global temperature regime. In the series of water balance components for the continents there are no long-term trends. The fluctuations of the mean annual moisture fluxes exchanged between the oceans and continents are apparently determined by a combination of local evaporation factors. This conclusion is consistent with the Hasselmann stochastic theory of climate. There is only a slight correlation between iceberg runoff and macroscale changes in the temperature regime. A similar result is given from a study of the correlation between iceberg runoff and precipitation series. Changes in

the annual increments of water volume in the ocean also have a stochastic character. Temporal changes in averaged ocean level do not contain a linear trend. The principal contribution to variability of the annual increments of water volumes in the oceans and water reserves on the land is, however, iceberg runoff, primarily from Antarctica. It seems clear that the changes in volume of continental glaciation and ocean level are less sensitive to changes in air temperature than to changes in the precipitation regime. Precipitation falling on the continental glaciers, especially in Antarctica, is the most probable mechanism of changes in ocean level in the near future. Figures 1; tables 4; references 40: 23 Russian, 17 Western. [292-5303]

OCEANOGRAPHY

COMPUTER MODEL OF SEA OF AZOV'S ECOSYSTEM

Moscow NEDELYA in Russian 1-7 Apr 85 p 4

[Article by V. Khokhlachev]

[Text] Everyone on Deribasovskaya Street says that it is somewhat like having all of the Sea of Azov's 300 cubic kilometers of water sent to Odessa. And that scientists of the Odessa branch of the Ukrainian Academy of Sciences' Institute of Economics are studying the sea here. Academician A. N. Alymov, head of a department of the institute, reported the following in regard to this news:

"The Sea of Azov itself remains intact and in its proper place. A copy of it that is greatly reduced in size is now located in Odessa; it is a simulation model of the Sea of Azov's ecosystem. It is put into operation by means of a program-complex that was developed for a BESM-6 computer. A data bank that was compiled and a specially developed system of software have made it possible to impart natural traits to the model and make it lifelike, with all of life's features.

"This compact electronic model of the sea is the result of joint work by scientists and specialists not only of Odessa but also of Rostov University, the Azov Scientific Research Institute of the Fishing Industry, and the Ukrainian Academy of Sciences' Marine Hydrophysics Institute. Ecologists are now capable of reproducing all of the main hydrophysical, chemical and biological processes which take place on the surface and at deep levels of the water, from the mouth of the Don River to the Kerch Strait. This is the first complete model of a body of water in world practice which makes it possible to conduct specific studies of the marine ecological environment, forecast its behavior in various situations, and control the complex of natural and technical features of a large mass of water."

FTD/SNAP
CSO: 1865/278

NEW SHIP 'DMITRIY NALIVKIN' FOR MARINE GEOLOGY

Moscow VODNYY TRANSPORT in Russian 26 Mar 85 p 4

[Text] Leningrad--The name of the eminent Soviet geologist, Academician D. V. Nalivkin, has been given to a new scientific research vessel for marine geological survey work. The ship "Dmitriy Nalivkin", which was built to Soviet specifications in Finland, has arrived in Leningrad. Here specialists of the association "Sevmorgeologiya" (Northern Marine Geology) will outfit it with the latest geophysical equipment intended for study of the deep-level structure of the sea bottom.

FTD/SNAP
CSO: 1865/278

RESEARCH SHIP 'KOROLEV' RETURNS FROM STUDIES OF JAPAN CURRENT

Moscow VODNYY TRANSPORT in Russian 16 Feb 85 p 3

[Text] Vladivostok--The "Akademik Korolev", flagship of a scientific research fleet, has returned to Vladivostok after a three-month ocean cruise. This was the largest expedition in recent years to study problems of the interaction of the ocean and the atmosphere.

The scientists worked in the region of the warm Japan Current, which is one of the five most energy-active zones of the ocean and where complex processes of the formation of weather over land take place.

FTD/SNAP
CSO: 1865/278

PLANS FOR ATLANTIC CRUISE OF NEW RESEARCH SHIP 'STRAKHOV'

Moscow IZVESTIYA in Russian 9 Apr 85 p 6

[Article by A. Pral'nikov]

[Excerpt] Mooring and sea trials of the scientific research ship "Akademik Nikolay Strakhov" will begin shortly. After the flag is raised on this vessel, it will make a short trip to Kaliningrad, which will become its port of registry. It will not anchor there for long; the route of its maiden cruise has already been plotted. The "Akademik Nikolay Strakhov" will head for the equatorial region of the Atlantic's eastern sector, for the deepest point of this ocean--the Romanche Trench.

B. Zolotarev, senior science associate of the USSR Academy of Sciences' Geology Institute and scientific director of this cruise, told about its program:

"The scientific research ship 'Akademik Nikolay Starkhov' belongs to the first series of ships that are specially intended for geological and geophysical work. Its equipment is excellent, and it has a system that prevents rolling and pitching, which is particularly important when work is being done at great depths.

"The ship's equipment complex includes devices for work with instruments directly on the ocean floor; special apparatus connected to a shipboard computer allows hydrogeochemical studies to be conducted on a routine basis. A multibeam sonic depth-finding system makes it possible to compile detailed maps of floor relief."

"How long will the maiden cruise last, Boris Petrovich?"

"Seventy days, more than 20 of which we have planned as working days at stations. It must be said that this is the highest percentage of such working time for all of the research cruises that have been organized up until now. Several visits to ports are planned, particularly a visit to Praia, the capital of the Republic of Cape Verde, to which we are to deliver a motor vehicle for Soviet geologists who are doing prospecting there.

"The Romanche Trench, which is almost 8 kilometers long, and two scientific survey areas in the vicinity of the Cape Verde Islands will become our main areas of work. The ship's whole system of hoisting equipment and apparatus is to be tested at the deepest point of the Atlantic. And in the survey areas, geophysical parameters are to be compared with already known data that were obtained during the 49th cruise of the research drilling vessel 'Glomar challenger.'"

"What is the main purpose of the trial cruise?"

"It will be a test cruise; the performance of all of the ship's research equipment-complexes and of the navigation equipment-complex is to be tested. Representatives of Finalnd's 'Hollming' firm, which built the ship, will monitor the operation of all of its systems.

"As for the purposes of the cruise, they are, properly speaking, to compile maps of floor relief and to study the structure of the upper layers of the Earth's crust beneath the ocean, non-uniformities of the crust's structural zones, and alternations of volcanic rocks according to depth."

FTD/SNAP
CSO: 1865/303

UDC: 551.464.34:511.465.7

MODELING OF SEASONAL EVOLUTION OF CARBON CYCLE IN OCEAN-ATMOSPHERE SYSTEM

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 1, Jan 85 (manuscript received 7 Apr 83, after revision 6 Jun 83)
pp 66-75

KAGAN, B. A., RYABCHENKO, V. A. and SAFRAY, A. S., Oceanology Institute,
USSR Academy of Sciences

[Abstract] A combined model for the seasonal evolution of heat conditions and the carbon cycle in the ocean-atmosphere system is proposed. The basis of the combined model is a thermodynamic model of the seasonal evolution of the ocean-atmosphere system suggested in a previous study. The atmosphere and ocean in the northern hemisphere are represented as a system of five interconnected boxes - two atmospheric and three oceanic. The two oceanic boxes are the upper quasihomogeneous layer and the deep layer of the ocean in the temperate and lower latitudes, within which the influx of heat from the atmosphere is balanced by vertical advection (upwelling) of cold deep waters. Comparison of calculated and experimental results shows that the major factors determining the mean values and seasonal variability of characteristics of the carbon cycle in the ocean-atmosphere system are the existence in the ocean of cold deep water formations with sharp increases in rate of absorption of atmospheric CO₂, fluctuation of sources and sinks of organic CO₂ and variation of ocean water temperatures. External factors include the short-wave solar radiation flux at the upper atmosphere boundary, absorption and emission of short-wave and long-wave radiation, atmospheric and surface albedo, mean annual production, consumption and half-life of organic matter, ocean depth, wind speed, humidity and continental area. Figures 1; tables 2; references 22: 10 Russian, 12 Western.

[256-6508]

19 June 1985

UDC: 551.465.558

STUDY OF SIGNIFICANCE OF BOTTOM RELIEF IN BAROCLINIC MODEL OF EQUATORIAL COUNTERCURRENT

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 1, Jan 85 (manuscript received 5 May 83, after revision 9 Jan 84)
pp 58-65

KUZ'MICHEVA, T. F., MIKHAYLOVA, E. N. and SHAPIRO, N. B., Marine Hydrophysics Institute, Ukrainian Academy of Sciences

[Abstract] A study of time variability and nonlinear interaction of barotropic and baroclinic components of current velocity was made, taking into account bottom relief in the process of formation of an equatorial countercurrent under the influence of an easterly wind and the heat flux through the ocean surface. The wind and heat flux excite circulation in the upper layer of the ocean. Processes in the baroclinic layer, acting though vertical movements at its lower boundary, cause movement in the deeper layers. During the initial stage, deep circulation does not match the bottom relief, the velocities of barotropic currents are high, particularly in shallow areas, and may significantly influence the current in the baroclinic layer. As time passes, deep currents and currents in the baroclinic layer adapt to the bottom relief, which is accompanied by a reduction in horizontal velocity gradients over submerged elevations. Figures 4; references: 5 Russian.
[265-6508]

UDC: 551.463.2

ANGULAR DISTRIBUTION OF INTENSITY OF SOUND RERADIATED BY OCEAN SURFACE AT SMALL GLANCING ANGLES

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 1, Jan 85 (manuscript received 21 Mar 83) pp 98-101

KOPYL, Ye. A., Acoustics Institute

[Abstract] A quantitative interpretation of field measurements made in a previous study of the angular structure of signals reradiated by the ocean surface with glancing incidence of acoustical waves is presented. Experimental and calculated values agree satisfactorily. Figures 2; references: 6 Russian.
[265-6508]

UDC: 551.466.8:551.461.5

INFLUENCE OF SHORT GRAVITY WAVES ON THERMAL RADIO EMISSION OF WATER SURFACE

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 1, Jan 85 (manuscript received 2 Jun 83) pp 83-89

IL'IN, V. A., NAUMOV, A. A., RAYZER, V. Yu., FILONOVIDCH, S. R. and
ETKIN, V. S., Moscow State Pedagogic Institute; Space Research Institute,
USSR Academy of Sciences

[Abstract] An experimental study is presented of the thermal radio emission caused by short gravity waves, accompanied by a quantitative interpretation of the data obtained. Emphasis is on an analysis of the variation in radio brightness contrast as a function of steepness of the short gravity waves, measured by means of a high-frequency radiometer operating in the $\lambda = 0.8$ cm range. Waves were artificially generated in a small channel, wavelength 8-40 cm, height 0.6-3 cm. Due to the high sensitivity of the radiometric apparatus used, effects were recorded which were related to the influence of the profile and steepness of the short gravity waves. The possibility of using the geometrical optics approximation for quantitative interpretation of the experimental data is demonstrated. The model is based on essentially non-Gaussian statistics of slopes corresponding to quasimonochromatic waves of finite amplitude. Figures 6; references 17: 16 Russian, 1 Western.
[256-6508]

UDC: 552.51/52:551.8

UPPER MESOZOIC TURBIDITES OF SOUTHERN WEST SAKHALIN DOWNWARP

Novosibirsk TIKHOKEANSKAYA GEOLOGIYA in Russian No 5, Sep-Oct 84
(manuscript received 3 Dec 83) pp 22-33

ZYABREV, S. V., Tectonics and Geology Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Khabarovsk

[Abstract] In the west Sakhalin downwarp the Albian deposits are very thick terrigenous masses, nonuniform alternations of sandstones, siltstones and argillites with some other rocks formed by erosion of the products of under-water and continental volcanism. The textures and specifics of stratification of deposits in the southern portion of the west Sakhalin downwarp were studied in order to determine the origin of the sedimentary formations, conditions of sedimentation and their evolution. The deposits are interpreted as turbidites. Western sources of clastic material have been established. The deposits were formed in deep-water alluvial fan systems at the base of a deep water slope dropping down toward the east. Ancient currents confirm the western sources of clastic material and indicate significant separation from the eastern edge of the basin. Changes in facies in the section in a

lateral direction are not related to transgressions and regressions on the eastern side of the downwarp, but rather reflect the specifics of the sedimentaiton process. Traces of erosion and redeposition of argillite and sandstone fragments are not related to erosion of the eastern side of the downwarp but rather to the sedimentation process itself. Figures 5; references 14: 7 Russian, 7 Western.
[168-6508]

UDC: 551.456.15

SPECTRUM OF TURBULENT FLUCTUATIONS IN SEA WATER DENSITY IN REGION OF LARGE WAVE NUMBERS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA A: FIZIKO-MATEMATICHESKIYE I TEKHNICHESKIYE NAUKI in Russian No 12, Dec 84
(manuscript received 23 Jul 84) pp 35-38

BRAMSON, M. A., FEDOROVSKIY, A. D., corresponding member, Ukrainian Academy of Sciences, NIKISHOV, V. I. and LUCHNIK, G. L., Hydromechanics Institute, Ukrainian Academy of Sciences, Kiev

[Abstract] The study of turbulent pulsations of velocity, temperature, salinity and density, and particularly of the behavior of spectral characteristics on the small scale, is an important subject in current studies of the ocean. This article analyzes the pulsation spectrum of the density of sea water in the region of large wave numbers. Turbulent inhomogeneities of the fields of temperature and salinity on a small scale are also analyzed. The spectral characteristics of pulsations of the density field and the boundary of the viscous-convective interval are determined by two parameters which can be measured by simultaneous recording of T and S pulsations by two sensors separated by a known distance. The averaging interval for the measurements can be rather small since the spatial scale corresponding to the viscous-convective interval is small. Processing of measurements can be alternated. References 4: 3 Russian, 1 Western.
[217-6508]

UDC: 551.464.679

FLUCTUATIONS IN CONCENTRATION OF ARTIFICIAL RADIONUCLIDES IN BALTIC AND NORTH SEAS IN 1977-1982

Moscow ATOMNAYA ENERGIYA in Russian Vol 57, No 6, Dec 84
(manuscript received 4 Apr 84) pp 405-407

STYRO, D. B., KADZHENE, G. I., KLEYZA, I. V. and LUKINSKENE, M. V.

[Abstract] Regular observations of the radioactive contamination of the Baltic and North Seas have been undertaken since 1973. The field data obtained have allowed estimation of possible concentrations of radionuclides and mathematical investigation of the structure of the fields of concentrations of the nuclides for revealing possible sources of contamination. The radionuclides are extracted from sea water by radiochemical methods plus a rapid sorption method for ^{135}Cs . Variations in the concentration of radionuclides in surface waters of the Baltic Sea have resulted from changes in global fallout patterns resulting from atmospheric nuclear testing. Contamination of the North Sea have resulted from changes in global fallout patterns resulting from atmospheric nuclear testing. Contamination of the North Sea has resulted from wastes discharged by nuclear industries. The results of measurement of concentrations of radionuclides in the surface waters of the Baltic and North Seas in the autumn of 1982 are described in some detail. Maps of the fields of concentration of radionuclides are presented. Figures 4; references 20: 12 Russian, 8 Western.
[219-6508]

UDC: 551.463

INTERACTION OF SOUND WAVES WITH FINE THERMOHALINE STRUCTURES OF OCEAN

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 30, No 6, Nov-Dec 84
(manuscript received 30 May 83) pp 728-734

ARTEL'NYY, V. V. and RAYEVSKIY, M. A., Applied Physics Institute, USSR Academy of Sciences

[Abstract] The interaction of acoustical waveguides with the fine thermo-haline structure of the ocean is analyzed on the assumption of multiple scattering. A study is made of a number of effects occurring in a broad class of waveguides as a result of the presence of a fine structure, including attenuation of the coherent component of the sound field, changes in its angular spectrum, transformation of normal mode energy and losses resulting from pumping of energy from nodes localized in the waveguide to modes attenuating in the surrounding ground. The results obtained are extended by means of a passage to the limit to the case of a channel with a sudden change in the speed of sound. The main results of the study are extended to the case of an underwater channel with a balanced profile. Figures 1; references 5: 4 Russian, 1 Western.
[188-6508]

UDC: 534.87

CORRELATION CHARACTERISTICS OF SIGNALS REFLECTED BY THE WAVY SURFACE OF OCEAN
IN MIRROR DIRECTION

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 30, No 6, Nov-Dec 84
(manuscript received 10 May 83) pp 772-776

ZHITKOVSKIY, Yu. Yu., NOSOV, A. V. and SAVEL'YEV, V. V., Oceanology
Institute imeni P. P. Shirshov, USSR Academy of Sciences

[Abstract] An experimental study was carried out to determine the correlation characteristics of pseudonoise signals reflected from a wave-covered surface in the mirror direction. The major measured quantity was the reciprocal correlation coefficient between the transmitted signal and the reflected signal. The transmitter was lowered from a ship on a 150 m cable. The receiver and preamplifier were lowered to the same depth from a buoy which was allowed to drift from the ship to a distance of 100-500 m, the changing distance changing the angle of the beam reflected from the surface of the ocean back down to the hydrophone. The radiator transmitted a pulsed signal with a pseudonoise carrier. The results were interpreted within the framework of ordinary correlation theory by processing several recordings, calculating the sign and ordinary correlation coefficients to determine the variation in sign correlation coefficient as a function of the ordinary correlation coefficient. Graphs of the average variation are presented. It was found that the medium did not distort the signal as it propagated through the water mass (within the limits of experimental accuracy). The correlation coefficient between the transmitted and reflected signals is thus determined entirely by the characteristics of reradiation of the sound by the wave-covered surface. Figures 5; references 7: 6 Russian, 1 Western.
[188-6508]

UDC: 534.26

NUMERICAL ESTIMATE OF EFFECTIVENESS OF APPROXIMATE EQUATIONS FOR ACOUSTIC
FIELD NEAR SURFACE OF DEEP SEA

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 30, No 6, Nov-Dec 84
(manuscript received 15 Jul 82; after revision 16 May 83) pp 813-818

PEREL', M. V., Leningrad State University imeni A. A. Zhdanov

[Abstract] The acoustic field in an oceanic waveguide is calculated. The calculations for various velocity profiles confirm the effectiveness of the approximate equations of V. S. Buslayev, who assisted in the preparation of the article. Figures 5; references: 6 Russian.
[188-6508]

19 June 1985

UDC: 552.31:551.35

PETROCHEMICAL TYPES OF MAGMATIC ROCKS OF OCEAN FLOOR AND PATTERNS OF THEIR DISTRIBUTION

Moscow BYULLENTEN' MOSKOVSKOGO OBSHCHESTVA ISPYTATELEY PRIRODY: OTDEL GEOLOGICHESKIY in Russian Vol 60, No 1, Jan-Feb 85
 (manuscript received 25 Mar 83) pp 18-27

ABRAMOV, A. V., RYAKHOVSKIY, V. M. and MIRONOV, Yu. V., Moscow State University

[Abstract] In order to classify petrochemical data on ocean floor crustal rocks the authors used an algorithm for processing multivariate samples, a nonparametric classification method. The classification includes no a priori assumptions concerning the structure of the sample and introduces no predefined numerical criteria. The distances between points are applicable to samples with any multivariate distribution. The initial data used were compositions of magmatic oceanic rock from a previous publication. The processing allowed the following numbers of clusters to be distinguished in the sample in each of the four steps: 239, 90, 29, 7. The seven final clusters are described. It is concluded that the absence of unidirectional petrochemical evolution of oceanic basalts upon transition from one morphological structure to another and their sharp petrochemical specialization in this case indicate the relative nondependence of the paths of development of different morphostructural zones in the ocean floor. Figures 3; tables 1; references 17: 16 Russian, 1 Western.
 [230-6508]

UDC: 550.384

INTRUSIVE ROCKS OF OCEANIC LITHOSPHERE AS POSSIBLE SOURCES OF ANOMALOUS MAGNETIC FIELD OF OCEAN

Moscow BYULLENTEN' MOSKOVSKOGO OBSHCHESTVA ISPYTATELEY PRIRODY: OTDEL GEOLOGICHESKIY in Russian Vol 60, No 1, Jan-Feb 85
 (manuscript received 14 Feb 84) pp 28-41

NAZAROVA, Ye. A., Lithosphere Institute, USSR Academy of Sciences, Moscow

[Abstract] Results are presented from study of rock dredged from the ocean floor, plus data published in a previous review on the magnetic characteristics of 50 oceanic intrusive rocks brought up during several cruises of the "Glomar Challenger." The intrusive rocks represent a cross-section of the oceanic crust. The samples available are very few in number. Available data on ore mineralogy and magnetic characteristics are analyzed for the available specimens. Analysis of the magnetic characteristics of the rocks shows that neither fresh cumulative gabbro containing fine-grained magnetite nor amphibolitized and serpentized gabbro containing magnetite grains from

pseudo-single-domain to multi-domain size can be considered regulator sources of linear magnetic anomalies. Thin dolerite sills containing fine-grained magnetite with hardened edges may be sources of local magnetic anomalies. Peridotites representing the lower portion of layer 3B and the upper mantle, upon serpentization, as a result of the formation of secondary magnetite, take on intensive and stable chemical magnetization. Only serpentinized cumulative peridotites have the necessary magnetic characteristics to be sources of linear magnetic anomalies.

Figures 3; tables 3; references 16: 5 Russian, 11 Western.
[230-6508]

UDC: 563.14(265.2)

COMPOSITION AND AGE OF SILICEOUS ROCKS OF SHIRSHOV RIDGE (BERING SEA)

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA in Russian No 11, Nov 84 (manuscript received 14 Jun 83) pp 80-85

TSUKANOV, N. V., VISHNEVSKAYA, V. S., KAZARINA, G. Kh. and VITUKHIN, D. I., Geology Institute, USSR Academy of Sciences; Lithosphere Institute, USSR Academy of Sciences; Oceanology Institute, USSR Academy of Sciences, Moscow

[Abstract] During the 29th cruise of the research vessel "Dmitriy Mendeleyev" in the summer of 1982, geological prospecting work was conducted on Shirshov Ridge in the Bering Sea. Determination of the tectonic position of this structure is a key to the understanding of the geological evolution of the Bering Sea region. A total of twelve dredging operations were conducted on the ridge, bringing up abundant and varied rock material with a total weight of about 400 kg. The siliceous and siliceous-clayey rock included paleontological remains. Radiolarian skeletons were obtained from the lithified rock by hydrofluoric acid etching. Radiolaria and diatoms were obtained from the formations by breakdown with hydrogen peroxide. A study of these remains allowed late Miocene-Paleogene and Late Cretaceous-early Paleogene complexes to be distinguished, as well as a rare Triassic complex. The rock is described in its stratigraphic sequence from bottom to top.

Figures 1; references 16: 6 Russian, 10 Western.
[169-6508]

MAGMATIC PROVINCES AND TECTONICS IN PACIFIC OCEAN

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA in Russian
No 11, Nov 84 (manuscript received 22 Mar 84) pp 13-18

PUSHCHAROVSKIY, Yu. M., Geology Institute, USSR Academy of Sciences, Moscow

[Abstract] In recent years several expeditions have been conducted in the central and northern Pacific Ocean, yielding good collections of oceanic crustal rock. Processing of materials collected during the 21st, 23rd and 28th cruises of the research vessel "Dmitriy Mendeleyev" has revealed significant differences in the chemism of basalts of the abyssal plates, large upthrusts with thickened crust and linear volcanic ridges. The abyssal plates have been tested in a number of areas. A determination of correlations between the large structural formations and basalt magmatism of the Pacific Ocean floor is very important for an approach to the geological history problems of this area. There have been at least two major tectonic-magmatic stages in the central and northwestern Pacific. Each major stage reflects a unique combination of geological conditions. The possibility of distinguishing and differentiating magmatic provinces allows basaltic series differing in their petrochemical features and content of individual metals to be distinguished. Analysis of the composition of mantle tectonites has shown regional differences in the composition of the upper mantle existing before the partial melting with which the formation of specific complexes is associated. The correlation which has been observed between magmatism and major tectonic elements and regions in the Pacific indicates the complex picture of geological development of the lithosphere in this area, which cannot be reduced to simplified systems of movement of a homogeneous lithospheric monolith. Implementation of the Soviet research project "Litos" will provide important new data on the geology of the oceans. However, additional specialized marine expeditions in different oceans are required to supplement the available factual information. References 11: 5 Russian, 6 Western.

[169-6508]

UDC: 550.41:551.3

GEOCHEMISTRY AND ENERGETICS OF CYCLING OF MATTER IN FORMATION OF CRUST IN ACTIVE STRUCTURES OF OCEAN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 279, No 5, Dec 84
(manuscript received 4 May 84) pp 1184-1189

IL'IN, V. A. and SHCHERBAKOV, A. V., Geology Institute, USSR Academy of Sciences, Moscow

[Abstract] A geochemical model was developed to check the quantitative relationships between the sedimentary and volcanogenic matter during the course of the cycling of matter related to the formation of the crust in active ocean structures. The model shows that the subduction zone should receive iron and magnesium ions from the mantle. Remaining elements are carried into the crust, the accumulation of silica and alumina in the crust supporting constant oxidation. The problem of the high content of Ca in sedimentary rock and the shift of the Na/K ratio in the direction of K are explained. The model thus explains the observed chemical differentiation between continental and oceanic crusts, as well as the mechanism of their development and evolution. Processes of transformation of an oceanic crust to a continental crust in subduction zones are calculated to require $7.5 \cdot 10^{18}$ calories of heat per year. The hydrothermal process on the continents and ocean floor consumes $8.0 \cdot 10^{18}$ cal/yr, $6.4 \cdot 10^{18}$ cal/yr being carried away by hydrotherms and $1.6 \cdot 10^{18}$ cal/yr being absorbed by deep hydrothermal systems. This means that the major effect of hydrothermal activity is restricted to the midocean ridges, only one-fifth being associated with volcanic regions. A diagram of the interrelated crust and asthenosphere is presented. Figures 2; tables 1; references: 6 Russian, [222-6508]

UDC: 629.127

STRUCTURE OF TADJOURA RIFT IN GULF OF ADEN BASED ON DATA FROM MANNED SUBMERSIBLES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 279, No 5, Dec 84
(manuscript received 30 Mar 84) pp 1189-1193

LISITSYN, A. P., corresponding member, USSR Academy of Sciences, BOGDANOV, Yu. A., ZONENSHAYN, L. P., KUZ'MIN, M. I. and SAGALEVICH, A. M., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] A section of Tadjoura rift near 45°E was selected where the rift makes the transition to the structures of Sheba Ridge. An area of $2,310 \text{ km}^2$ was studied in detail and mapped at 1:50,000. The geological situation in this area was evaluated by studying more than 100 samples taken by corers and bottom dredges. The detailed studies allowed areas to be selected for thirty-two missions by the "Paysis" submersibles. In one month the submersibles

spent twelve days under water, traversing 90 km along the bottom, bringing up 155 geological specimens and taking more than 500 color photographs. Sample photographs are presented (in monochrome). Orientation of structural elements in the rift changes significantly from the edges to the center, with thrust steps on the edges having a sublatitudinal strike, whereas the internal rift is oriented in a new direction 295-300 degrees. Neither of these directions is orthogonal to the direction of spreading. Intensive hydrothermal activity was observed in the rift. Figures 2; references 5: 1 Russian, 4 Western.
[222-6508]

UDC: 551.464.1:550.4

NEW DATA ON BEHAVIOR PATTERN OF COPPER IN INDIAN OCEAN WATERS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 279, No 5, Dec 84
(manuscript received 6 Apr 84) pp 1220-1224

KURIL'CHIKOVA, G. Ye., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] A new method is suggested for interpreting the results of experiments by comparing data on the concentrations of labile complexes of metals in freshly sampled sea water after ultrafiltration with the same data after equilibrium is established in the system and processes of spontaneous change in the matter stop, requiring 1 to 1.5 year. The concentrations must be compared with the total concentrations of the metal, showing the significance of inert metal complexes. Experimental studies of sea water have established that the fraction of the labile concentration of complexes in freshly collected water, continuously changing over time until equilibrium is achieved, is a characteristic of the composition of the natural solution and is quite sensitive to its changes. The experimental data on the behavior of copper as an indicator element show that middle-depth ocean water differs significantly from both abyssal and surface water in its physical and chemical properties. The method suggested can be used for comprehensive and detailed study of biogenic sedimentation and the zonality of ocean waters, and also to reveal certain geochemical characteristics of ocean water above metal-bearing sediments. Figures 4; references: 8 Russian.

[222-6508]

CONTRIBUTION OF DIFFUSION PROCESSES TO THE ELECTRIC FIELD OF THE OCEAN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 279, No 5, Dec 84
(manuscript received 8 Dec 83) pp 1234-1238

TISHCHENKO, P. Ya., Pacific Ocean Oceanological Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok

[Abstract] A study is made of that portion of the electric field in the ocean which results from diffusion of ions in sea water due to the presence of concentration, gravitational and temperature fields. Methods of linear non-equilibrium thermodynamics are used in the study. An electric profile is computed to establish the magnitude and nature of the electric field in the ocean caused by the processes in question, corresponding to an arbitrary hydrophysical profile. All three contributions to the total electric field considered in this article are of the same order of magnitude. The maximum electric field gradients are found in the upper levels of the ocean where the changes in parameters t and S are greatest. Figures 1; tables 1; references 11: 2 Russian, 9 Western.

[222-6508]

UDC: 553.982.468

OIL AND GAS DEPOSITS ON CONTINENTAL SLOPES OF THE OCEAN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 2, Jan 85
(manuscript received 19 Oct 84) pp 423-426

GEODEKYAN, A. A., corresponding member, USSR Academy of Sciences,
ZABANBARK, A. and KONYUKHOV, A. I., Oceanology Institute
imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] It has been suggested that some 95% of the hydrocarbon deposits in the ocean will probably be found in shelf zones and on the continental slopes at depths of not over 3,000 m and 65% not over 300 m. Some twenty-six deposits of oil, gas and gas condensate have been found to date on the continental slopes of the ocean. Almost all hydrocarbon deposits are located on the slopes of the passive continental margins of the Atlantic and Indian Oceans. The collectors for oil and gas deposits are almost exclusively sandstones. Analysis of known deposits shows that ancient delta complexes on the continental margins contain oil and gas not only because they are characterized by good collectors, but also primarily due to the optimal relationship of natural reservoirs, continental rock and cover horizons. There are two stages in the formation of regional oil- and gas-bearing terrigenous masses, genetically related to rivers: periods of rift formation and burial of continental margins, and periods of cretaceous or early Cenozoic tectonic activation within the limits of a margin already formed, during which sinking occurred in the areas where ancient transverse rifts met the ocean. The oil and gas content of the continental margins is not only determined by rift-forming zones and paleodeltas, but also is related to perioceanic basins,

superimposed depressions and other structures within which various complexes of deposits such as reefs, shallow water marine and lagoon formations (and on active margins, turbidites) are developed. Tables 1; references 6: 2 Russian, 4 Western.

[232-6508]

UDC: 534.23

ACOUSTICAL FIELD OF DIRECTIONAL SOURCE IN OCEANIC WAVEGUIDES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 1, Jan 85
(manuscript received 13 Jul 84) pp 57-59

BYKOVTSOV, G. I., KUZNETSOV, G. N. and STEPANOV, A. N., Kuybyshev State University

[Abstract] A model is suggested for an equivalent point source having arbitrary directionality to replace actual sound sources radiating in an oceanic waveguide. The model allows calculation of the hydroacoustical fields of directional sources in a medium limited by division boundary surfaces for sufficiently low radiating frequencies. Expressions are obtained for the potential of an equivalent point source in waveguides of various types. By minimizing the maximum likelihood functional it is possible to use measured pressure values to estimate the multipole moments determining the directionality of radiation. The parameter estimation procedure using this method is better than when a Taylor expansion model is used. References: 3 Russian.

[229-6508]

UDC: 551.1:550.360

PETROLOGIC ASPECT OF FORMATION OF GEOSTRUCTURES IN MARGINAL SEAS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 1, Jan 85
(manuscript received 9 Oct 84) pp 178-182

PERCHUK, L. L., Institute of Experimental Mineralogy, USSR Academy of Sciences, Chernogolovka, Moscow Oblast

[Abstract] A study is made of the petrology of formation of geological structures in the marginal seas, since data are not available relating geo-dynamics and magmatism of intracontinental depressions. It is demonstrated in the example of the Sea of Japan that the formation of depressions is preceded by orogeny with superimposed acid and neutral magmatism and subsequent intensive denudation of volcanic structures. A change in the direction of vertical motion corresponds to predominance of andesites and basalts in volcanism, accumulation of thick masses of tuffs in narrow geo-synclinal depressions, followed by intensive underwater flows of andesite-basalts. The hypothesis suggesting formation of depressions by

the mechanism of magmatic substitution must be further experimentally and theoretically developed and confirmed. Figures 2; references 15: 13 Russian, 2 Western.
[229-6508]

UDC: 551.24-551.46

SPREADING IN DEVELOPMENT OF OCEANIC STRUCTURES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 1, Jan 85
(manuscript received 2 Dec 83) pp 182-185

PUSHCHAROVSKIY, Yu. M. and RUZHENTSEV, S. V., Geology Institute, USSR Academy of Sciences, Moscow

[Abstract] This article was stimulated by the question as to whether the width of a rift valley, rate of spreading and time of formation of basalts have always been the same as now. Data on the time of formation of tholeiitic basalts of different ages in the midocean ridges are incomplete. Based on studies of the East Pacific Rise and the western limb of the Mid-Atlantic Ridge, an attempt is made to explain differences in the structure of the first and second layers of the ocean on the one hand and volcanic-sedimentary series of various stages of development of eugeosynclinal zones in the Paleozoic folded belts on the other. Among the widely varied structures of the oceanic crust, the contemporary oceans represent a type characterized by the presence of a single world system of narrow volcanically active ocean spreading centers. Reconstructed paleoocean structures arose in a more complex geodynamic situation than the oceans. They are characterized by distributed spreading, which appeared in the contemporary oceans in the early stages of their development. The essence of evolution of the Phanerozoic structures with the oceanic type crust has been one of changes from smaller but more complex structures and combinations to larger and simpler structures. The mesooceans can be considered transitional structures. Figures 1; references 15: 2 Russian, 13 Western.
[225-6508]

UDC 533.6.011.541.12

INFLUENCE OF WATER VAPOR ON DISTRIBUTION OF TURBULENT WAKE PARAMETERS

Moscow MEKHANIKA ZHIDKOSTI I GAZA in Russian № 1, Jan-Feb 85
(manuscript received 19 Mar 84) pp 138-142

PILYUGIN, N. N. and TIKHOMIROV, S. G.

[Abstract] An experimental study was made of phenomena transpiring in an air flow near models flying on an aeroballistic path at hypersonic velocities. The objective was a determination of the influence of water vapor on measurements of gas parameters such as electron concentration or radiation intensity.

(The authors have formulated the problem and given the necessary mathematical transforms in studies published earlier.) Particular attention is given to an article by R. L. Schapker, et al., entitled "NO₂ Chemiluminescent Wake Radiation," in AIAA PAP., No 68-702, 1968. It is noted that Schapker, et al. made a theoretical study of the influence of chemical reactions with the participation of water vapor in the air only on chemiluminescent radiation in a wake; no attention was given to the influence of water vapor on the electron concentration. This article gives the results of computations of the distributions of nonequilibrium parameters in a wake with allowance for chemical reactions in the air and water vapor under conditions characteristic for aeroballistic experiments. Specifically, the authors give a solution of equations for an axisymmetric turbulent boundary layer describing a current of a nonequilibrium multicomponent gas in the distant wake behind such a body moving at hypersonic velocity. On this basis a model of chemical kinetics is presented which takes 22 components into account. A total of 91 reactions is possible. A list of reactions between dry air components is given, as well as reactions with the participation of components containing hydrogen. It is shown that use of the proposed chemical kinetics model and computation method make it possible to compute parameters of a distant wake more precisely than by the Schapker method. It is clearly demonstrated that in the interpretation of the results of ballistic measurements for measuring the intensity of chemiluminescent radiation and electron concentration in a distant air wake it is necessary that the influence of water vapor be taken into account when $\xi_{H_2O} > 10^{-4}$. Figures 4; tables 1; references 22: 16 Russian, 6 Western.

[305-5303]

UDC 517.9:550.3

DIFFRACTION OF INTERNAL WAVES DESCRIBED BY EQUATION OF SLIGHTLY STRATIFIED FLUID ON HALF-PLANE

Baku IZVESTIYA AKADEMII NAUK AZERBAYDZHANSKOY SSR, SERIYA NAUK O ZEMLE
in Russian No 5, 1984 pp 76-83

ISMAIL-ZADE, A. T.

[Abstract] The diffraction of plane waves in a slightly exponentially stratified fluid on a plane barrier placed in this fluid was investigated. The problem is pertinent with respect to the study of internal waves in the ocean. The considered problem is regarded as highly unusual from the mathematical point of view because it is formulated as a boundary value problem for a hyperbolic equation with boundary conditions characteristic for elliptical equations. It was demonstrated long ago that such a formulation is incorrect if only a limited region is examined but the problem is well formulated and has physical sense in the case of unlimited regions when there are appropriate conditions in the neighborhood of an infinitely distant point. The formulation and results are compared with a series of studies along these lines by S. A. Gabov, et al. (DOKLADY AKADEMII NAUK SSSR, Vol 264, No 1, 1982; Vol 265,

19 June 1985

No 1, 1982; Vol 268, No 5, 1983; ZHURN. VYCH. MATEM. I MATEM. FIZIKI, Vol 22, No 6, 1982). It is shown that the diffraction pattern obtained with $\beta^2 \rightarrow 0$ outside a restricted region differs qualitatively from the diffraction pattern examined by Gamov. Specifically, the neglecting of the term $\beta^2 U$ in the Klein-Gordon equation, employed by Gamov, gives erroneous results.

References: 6 Russian.

[265-5303]

UDC 551.35(261).264

DISTRIBUTION OF PRINCIPAL TYPES OF RECENT BOTTOM DEPOSITS ON NORTHWESTERN SHELF OF GUINEA

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 1, Jan 85
(manuscript received 4 Jun 84) pp 12-15

YEMEL'YANOV, V. A., Geological Sciences Institute, Ukrainian Academy of Sciences, Kiev

[Abstract] The results of studies of bottom deposits in the coastal zone of the Guinea shelf are presented on the basis of 60 samples of recent deposits from depths of 4-15 m (Fig. 1 is a map of CaCO_3 distribution in this area). It was possible to discriminate the following principal granulometric types of recent bottom deposits: sands, silty sands, sandy silts and silts. Among the minerals quartz predominated in all the samples. In the sandy silts and the silty sands a considerable role in forming the structure and mineralogical composition is played by remnants of calcareous skeletons and shells of benthos organisms. Since on the adjacent part of the continent there are virtually no calcareous rocks, the CaCO_3 content in bottom deposits is indicative of the role of biogenous factors in their formation. The role of the biogenous factor increases with depth. Winds play a major role in the receipt of sedimentary material. This is indicated by the presence of fractions <0.05 mm, primarily quartz grains with typical aeolian working. Abrasion of shores and the bottom also plays an important role in the formation of sediments. The collected data were used in compiling a map of bottom deposits in the coastal zone of the shelf to depths of 15-20 m (Fig. 2). The greatest part of the bottom is covered with terrigenous and biogenous-terrigenous silty sands and sandy silts. The fine silty sediments found in limited areas remote from the shore appear to be deposits of ancient mangrove shores. Figures 2; references 5: 4 Russian, 1 Western.

[257-5303]

POSSIBILITY OF SOUNDING EARTH BY USING ELECTROMAGNETIC FIELD OF SEA CURRENT

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 2, Feb 85
(manuscript received 20 Dec 82) pp 70-74

SMAGIN, V. P., FONAREV, G. A. and SAVCHENKO, V. N., Far Eastern State University; Terrestrial Magnetism, Ionosphere and Radio Propagation Institute, USSR Academy of Sciences

[Abstract] The authors analyze the possibilities of determining the conductivity of bottom rocks by measuring different combinations of components of the electromagnetic field of a current on the ocean floor. It is shown that the sea current induces an electromagnetic field in the geomagnetic field. Then a formula is derived for the magnetic component B. After determining B it is possible to find the electric field in sea water and in rocks beneath the ocean layer. The parameter ϵ is introduced which makes it possible to ascertain the vertical gradient of the magnetic field in bottom rocks; a function is derived which characterizes the magnetic field in the bottom rocks. Formulas are derived which can be used in estimating the width of a current by an electromagnetic method. It is shown, therefore, that with electromagnetic sounding in the fields of sea currents it is possible to make a simple interpretation of the experimental data within the framework of an exponential model of ocean floor conductivity. [This article essentially represents a continuation of an earlier study by the authors in GEOMAGNETIZM I AERONOMIYA, Vol 22, No 4, pp 623-628, 1982 entitled "Possibility of Studying Sea Geoelectric Sections From the Electromagnetic Fields of Currents."]

References: 3 Russian.
[290-5303]

UDC 550.373

ELECTROMAGNETIC FIELD OF THREE-DIMENSIONAL SURFACE SEA WAVES

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 2, Feb 85
(manuscript received 20 Dec 82) pp 65-69

SOCHEL'NIKOV, V. V., Southern Branch, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences

[Abstract] Numerous attempts have been made to obtain estimates of the electromagnetic field of three-dimensional sea waves. Use has been made of hypothetical models with an even distribution of velocity through the entire fluid layer. Since these efforts have been largely unsuccessful, an effort was made to obtain a rigorous solution for the electromagnetic field of three-dimensional sea waves of wind origin. The same assumptions are made as for a model of a two-dimensional wave formulated earlier by the author (OSNOVY TEORII YESTESTVENNOGO ELEKTROMAGNITNOGO POLYA V MORE, Leningrad, Gidrometeoizdat, 1979, 216 pages). First an expression is derived for the

velocity of fluid particles, making it possible to proceed to the derivation of expressions for the induced electromagnetic field. It is shown that the induced electric field is a potential field. Formulas are then found that show that the induced electric field is not dependent on the conductivity of the ambient medium; the current does not flow into the bottom and therefore the magnetic field should not be dependent on bottom conductivity; the induced electromagnetic field is completely determined by the vertical component H_z (TJ-wave). All this is demonstrated and expressions are derived for the components of strength for the induced magnetic field. The induced magnetic field is dependent only on sea water conductivity. Since the EM field induced by three-dimensional sea waves is not dependent on bottom conductivity it cannot be used for its electromagnetic sounding. The induced field (as in the case of two-dimensional sea waves) is noise in electromagnetic research in the sea. References: 5 Russian.
[290-5303]

UDC 551.79(4=015)

STRATIGRAPHY OF SEDIMENTS IN CENTRAL AND EASTERN MEDITERRANEAN

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA in Russian No 2, Feb 85 (manuscript received 8 Jun 83) pp 59-64

SOROKIN, V. M., AFANAS'YEVA, M. S., KURENKOVA, V. G. and CHERNYSHOVA, N. B., Geology Faculty, Moscow State University

[Abstract] In many parts of the Mediterranean there have been only limited stratigraphic studies. The least attention has been given to the near-shore portions of the Adriatic, Ionian and Levantine Basins where sedimentation processes are typically most diverse and complex. A total of 57 cores of sediments with a length up to 6 m were obtained during cruises of the "Akademik Pokrovskiy" in 1973, 1979 and 1980. The cores were taken along profiles intersecting the continental slope and adjacent abyssal depressions. The sediments were broken down by a number of lithological and biostratigraphic methods, including study of plankton and benthos foraminifera, pollen and spores, sapropel and ash interlayers and textural varieties. Using a combination of micropaleontological and lithological methods which mutually supplement one another it was possible with a high degree of accuracy to discriminate the following horizons in the Late Quaternary deposits of the Central and Eastern Mediterranean: Riss, Riss-Wurm, Wurm and Holocene. The results confirm the principles of stratification of Mediterranean sediments proposed by Olausson, Ryan and others. As illustrated in several graphs, the correlation of sections in the studied cores made it possible to plot the nature of change in the thicknesses of sediments in horizons of the same age within margins of the basin different in their tectonic position. Figures 3; references 20: 4 Russian, 16 Western.
[277-5303]

19 June 1985

UDC 551.462+551.24(261)

RELIEF AND TECTONICS OF CONTINENTAL MARGIN OF GUINEA

Kiev GEOLOGICHESKIY ZHURNAL in Russian Vol 45, No 2, Mar-Apr 85
 (manuscript received 6 Jul 83) pp 36-43

GREKU, R. Kh., NASIROV, A. Ya., MISHCHUK, I. T., FEDOROV, V. N. and
 GUR'YEVA, T. B., Marine Hydrophysics Institute, Ukrainian Academy of Sciences,
 Sevastopol; Geology Institute, Azerbaijan Academy of Sciences, Baku

[Abstract] The continental margin off Guinea extends in a southwesterly direction for 250-300 km and on three sides is bounded by the continental slope. The margin has a level surface, tilted slightly from the continent toward the ocean, constituting an accumulative-denudational and in part an accumulative plain. Bottom relief was studied on the 28th cruise of the "Akademik Vernadskiy." The collected data were used in plotting a bathymetric chart (Fig. 1) and a geomorphological map of the shelf and continental slope (Fig. 2). The shelf relief in general is smooth or slightly undulating and there are no abrupt rises or depressions; however, it is dissected by a series of submarine canyons. On the basis of the nature of relief and bottom surface slope it was possible to define inner and outer zones on the shelf. The first occupies most of the shelf, begins directly at the shoreline and extends to a depth of 50-60 m; it is characterized by a very gentle bottom slope of about 5'. The outer zone is considerably narrower than the inner slope and the surface slope is 20-30'. The outer edge is characterized by a large number of hills, scarps and terraces. Tectonic factors are probably responsible for genesis of the continental margin. The terrace levels are undoubtedly directly related to abrasional-accumulative processes. Eustatic rises of ocean level possibly played a significant role. Tectonic movements were the initiator of all these processes. They account for formation of bottom relief, the distribution of sectors of denudation and accumulation and the nature of sedimentation. The steplike subsidence of crustal blocks in the region of the Guinea continental margin is associated with dilatational forces and is consistent with the concepts of plate tectonics. Figures 3; references 7: 5 Russian, 2 Western.

[302-5303]

UDC 553.64(68)

PRESENCE OF PHOSPHORITE ON CONTINENTAL MARGIN OF EQUATORIAL AFRICA (BASED ON DATA FROM GUINEA TEST RANGE)

Kiev GEOLOGICHESKIY ZHURNAL in Russian Vol 45, No 2, Mar-Apr 85
 (manuscript received 26 Mar 84) pp 24-35

SHNYUKOV, Ye. F., BELEVSEV, R. Ya., MITROPOL'SKIY, A. Yu., SHCHERBAKOV, I. B. and GRIGOR'YEV, A. V., Geological Sciences Institute, Ukrainian Academy of Sciences, Kiev; Geochemistry and Mineral Physics Institute, Ukrainian Academy of Sciences, Kiev

[Abstract] Investigations in the Guinea test range, situated between 9° and 10°45'N, were carried out by a Soviet-Guinean expedition from aboard the

"Akademik Vernadskiy." About 40 stations were occupied where bottom samples were taken by bottom instruments. Hydrochemical, hydrophysical, lithological and mineralogical studies of these samples were made. It was possible to detect both Holocene phosphorite formation and its lithological expression and ancient bedrock phosphorites, hypothetically of Paleogene age. Figure 1 is a lithological map of bottom deposits in the Guinea test range. Other diagrams and maps in the text show a schematic section of the accumulation of sediments on the continental slope and shelf and the granulometric composition of bottom sediments, the phosphorus distribution in the surface layer of sediments, the distribution of vanadium in the surface layer of bottom sediments and the distribution of phosphates in water and bottom sediments. An earlier unknown geochemical anomaly of increased contents of phosphorus in bottom sediments over a considerable part of the area of the outer shelf and continental slope was discovered. Within the limits of the area of phosphoritic sediments there is a broad (100 x 20 km) band of phosphorite-glaucous sands and silts. The phosphorus is concentrated in rounded particles of phosphorites of sand and silt size. The predominant mineral is colophane and to a lesser degree francolite. The phosphorite-glaucous sands and silts are a mineral expression of the modern process of phosphorite formation transpiring on the continental margin of Guinea. This is evidence of a constant phosphatization of recent organic remains, the enrichment of the waters over the zone of development of sediments containing phosphorite with phosphorus as a result of the upwelling of waters. Figures 7; tables 1; references 11: 6 Russian, 5 Western.
[302-5303]

UDC 534.22:551.46

STRUCTURE OF ACOUSTIC FIELD IN DEEP SEA AT SHALLOW DEPTHS AND AT GREAT RANGES

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: FIZIKA, KHIMIYA in Russian No 22, Nov 84 (manuscript received 9 Apr 84) pp 9-17

BUSLAYEV, V. S. and PEREL', M. V.

[Abstract] A study was made of the structure of the acoustic field in a deep sea at shallow depths and with great ranges. The problem is formulated as follows. The field is examined in the half-space $r = (x, y, z)$, $z \geq 0$. It is assumed that the water layer $0 \leq z < h$ is situated over a homogeneous underlying liquid half-space $h < z$ (bottom). The acoustic field $u = u(r)$ generated at the point by a harmonic source of the frequency f , situated at the point $r_0 = (x_0, y_0, z_0)$, is described by the equation $\Delta u + p^2 n^2 u = -\delta(r - r_0)$,

$n = c_* / c$, $p = 2\pi f / c_*$, where c_* is the minimum speed of sound c . It is also assumed that the speed of sound and density are dependent only on depth z ; the speed of sound in the bottom is greater than the speed of sound in the water layer and bottom density is greater than water layer density. (The equation is supplemented by ordinary boundary conditions.) It is further assumed that

the sea is deep and the speed of sound as a function of z has a single deeply situated minimum. An important characteristic of the medium is the function $D(\mu)$. It has a simple sense: it gives the horizontal period of the ray as a function of μ . The behavior of the field is discussed with

$r = \sqrt{(x - x_0)^2 + (y - y_0)^2} \gg r_{\max}$. Particular attention is given to the convergence zones, especially field structure in a distant convergence zone ($r d$). Also examined is the structure of the acoustic field at such ranges where the convergence zones considerably overlap ($r \leq d$). At such ranges interference effects become exceedingly complex and averaging procedures assume particular importance. In the case of greatly overlapping zones, with the field averaged over some interval less than the characteristic ray period, periodic peaks might appear against a background of cylindrical spreading. This background has a maximum if the depths of the source and receiver coincide. Figures 5; references 8: 7 Russian, 1 Western.
[208-5303]

UDC [(552.51:553.64)5551.351.2](671.8/9)]

MODERN PHOSPHORITIC SANDS ON SHELF OF GUINEA CONTINENTAL MARGIN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 4, Feb 85
(manuscript received 24 Jul 84) pp 964-966

SHNYUKOV, Ye. F., academician, Ukrainian Academy of Sciences, BELEVTSOV, R. Ya., MITROPOL'SKIY, A. Yu., SHCHERBAKOV, I. B. and GRIGOR'YEV, A. V., Geological Sciences Institute, Ukrainian Academy of Sciences, Kiev

[Abstract] Phosphorite-glaucous sands were discovered on the Guinea shelf for the first time by a Soviet-Guinean expedition on the "Akademik Vernadskiy" while working a test range situated between 9° and $19^{\circ}45'N$. The distribution of sediments on the continental margin is complex and is determined mostly by bottom relief (a map, Fig. 1, illustrates this complex pattern). For example, in the shallow-water part of the shelf, to the isobath -10 m, there is a predominance of quartz and quartz-feldspar sands, whereas at depths of 10-50 m there are slightly carbonaceous and oozy sands. There is an extensive zone of terrigenous sands of different grain size in the southern part of the range. The phosphorite-glaucous sands and siltstones most enriched with phosphorus occupy a zone measuring 20×100 km extending parallel to the shore; the median size of the phosphorite grains in these sands is 0.25 mm. Along the continental margin of Equatorial Africa there are both modern phosphorite-bearing sediments and ancient eroded phosphorites. There appears to be no genetic relationship between these two forms of phosphorite formation. The zones of maximum phosphorus content in the sediments do not correspond to zones of maximum P content in the water (500-800 m). The high P content in the water ensures a significant concentration of phytoplankton, zooplankton, benthos and other organisms in the water. Figures 1; references 3: 2 Russian, 1 Western.
[272-5303]

FIND OF RHEOLITES AND TRACHITES AND GEOLOGICAL SITUATION IN NORTHERN PART
OF EAST INDIAN OCEAN SUBMARINE RIDGE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 4, Feb 85
(manuscript received 27 Jun 84) pp 960-963

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[Abstract] Most studies of the geological structure of the Indian Ocean floor have suggested that the East Indian Ocean Ridge (90° Ridge) developed as a transformed fault and that it is characterized by exclusively basic volcanism. This article presents facts which contradict this. The data were collected on the 24th cruise of the "Pegas" (1983) during dredging in the region with the coordinates 1°9'N and 90°32'E. Highly modified volcanic-sedimentary rocks were raised which can be classified as tuffites or tuff-siltstones. Clastic material is represented by fragments of relatively little-modified basalts, rhyolites, dacites and trachites, a small number of grains of quartz and plagioclase and particles of ferromanganese encrustations. Sorting is absent. A table gives the chemical composition of rocks from the clastic fraction. Volcanic activity in the ridge is possibly continuing to the present time, as indicated by an anomalously high heat flow. The northern part of the ridge is characterized by seismic activity and manifestation of recent tectonic movements, including displacement of crustal blocks. The presence of rhyolites and trachites indicates that it is not basalts alone which are present in the East Indian Ocean Ridge; acidic and subalkaline effusives seem to be widespread. The association of basalts, rhyolites and trachites indicates an island arc nature of volcanism in the region. Situated to the east of the ridge is a trench with maximum depths greater than 6,000 m. In the northern part of the trench there is an increased thickness of sediments. The total crustal thickness within the ridge remains uncertain, but it is evidently not less than 23 km. The proximity of the ridge and trench and the nature of volcanism reveal a similarity to systems of island arcs and abyssal depressions in the Pacific Ocean. Figures 2; tables 2; references 14: 5 Russian, 9 Western.

[272-5303]

EVALUATING SCREENING EFFECTS AND TSUNAMI DANGER IN BAYS

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 20, No 12, Dec 84 (manuscript received 21 Feb 83, after revision 16 Jun 83)
pp 1206-1214

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[Abstract] In selecting sites for new construction in the Kuril Islands it is important to evaluate the tsunami danger of the pertinent parts of the coastline. Recommendations for the Kuril Islands have been published, but they are only preliminary. An effort has now been made to improve them by formulating a more adequate model of the source with defining of those peculiarities of the specific position of a bay which exert the most significant influence on formation of the maximum tsunami wave in the analyzed coastal zone. The analysis was based on observational data for the Kamchatka tsunami of 1952, which was catastrophic for the shores of Kamchatka and the Kuril Islands. The data used were for Pearl Harbor, Honolulu and Hilo. The processing method involved breakdown of the record into the signal at the source and the impulse function for penetration of the wave into a bay. It was found that the record can be represented in the form of the convolution of the source function common for all the records of one tsunami and the specific impulse function for the propagation path specific for each bay. It was found that the signal at the tsunami source is a periodic process with beats of great duration with a relatively narrow spectrum. The impulse function for the paths for closed bays contains a small number of oscillations and varies in characteristic times on the order of 1-1.5 hours. The characteristic time of tsunami filling of a bay is important to know for shielding the bay against a tsunami wave. Figures 6; tables 1; references 17: 15 Russian, 2 Western.

[235-5303]

UDC 551.463.2+593.75

SOUND SCATTERING BY JELLYFISH

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 20 Jun 83) pp 43-48

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[Abstract] Jellyfish have a soft, jellylike body whose elastic properties differ little from the elastic properties of water. For this reason jellyfish should only slightly scatter acoustic waves. However, the literature gives very high backscattering section values close to those for fish with swim bladders. Accordingly, experiments were made to determine the backscattering section (σ) of jellyfish and their dependence on frequency (20-200 KHz) and

irradiation aspect. The measurements were made with live jellyfish at a Black Sea station. The jellyfish were caught by a diver and carried under water to the measurement set-up. They were attached in a suspension system and had no contact with the air, thereby precluding attachment to their surface of any air bubbles which could significantly distort the measurement results. Three rather large Black Sea jellyfish (length 20-30 cm) were studied. All measurements were made when the length of the acoustic wave was much less than the size of the jellyfish. The authors give a mathematical model of a jellyfish as a sound scatterer in the form of a sphere with elastic parameters differing little from the ambient parameters. It is shown that the scattering is caused for the most part by the differences between the elasticity modulus of the scatterer and the elasticity modulus of the medium. Estimates of the anticipated acoustic effect attributable to individual jellyfish and their gatherings for different concentrations of jellyfish are given. The total scattering level which can be created by concentrations of jellyfish is considerable and the backscattering coefficient in many cases exceeds 10^{-9} - 10^{-8} m^{-1} , characteristic for the response limit of acoustic instruments. Figures 6; references: 9 Russian.

[283-5303]

UDC 551.464

INFLUENCE OF SESTON PHOSPHATASE ACTIVITY ON RATE OF PHOSPHORUS MINERALIZATION AND ITS RECYCLING IN PRODUCTION-DESTRUCTION CYCLE

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 12 Oct 82) pp 66-73

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[Abstract] A study was made of the vertical distribution of organic phosphorus and phosphatase activity in the southeastern Pacific Ocean. The rate of the photosynthesis process is limited by the rate of freeing of phosphates in the regeneration process. In a normally functioning community of oligotrophic waters the most important role in the mineralization of phosphorus is played by microheterotrophs. In order to estimate the rate of phosphorus regeneration a study was made of the enzymatic activity of alkaline phosphatase and the protein content in seston, as well as a determination of organic phosphorus. A total of 290 synchronous determinations of organic phosphorus and the rate of phosphorolysis were made at 17 stations which take in the region of the open ocean along a 200-mile zone from 8°S to Drake Passage. Comparison of the data indicates that the distribution of the total activity of phosphatase differs considerably both vertically and in dependence on the region. An estimate is made of the minimum times required for the recycling of phosphorus. In all the investigated regions in the layer 0-200 m the recycling of phosphorus occurs in the course of a 24-hour period. The contribution of mesoplankton to the recycling of phosphorus is less than in the case of microplankton, not only due to its lesser biomass, but also due to a lesser specific activity of phosphatase. For phytoplankton there is a close

interrelationship between the activity of phosphatase and the level of inorganic phosphate in the medium, a shortage of which induces this enzyme. Studies of phosphatase activity in different regions of the Pacific Ocean indicated that the rates of mineralization of organic phosphorus in the layer 0-200 m in oligotrophic and eutrophic regions differ by a factor of 5-10, whereas the recycling times of phosphorus in the production-destruction cycle differ by a factor of only 2-5. This is attributable to a simultaneous increase in the organic phosphorus and the rate of phosphorolysis in eutrophic regions. Figures 1; tables 4; references 20: 6 Russian, 14 Western.
[283-5303]

UDC 550.4

ORIGIN OF ELEMENT COMPOSITION OF OCEAN WATER

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 5, Feb 85
(manuscript received 28 May 84) pp 1234-1238

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[Abstract] There is still no generally accepted theory on the origin of the salt composition of the ocean. It is most widely accepted that anions enter ocean water from the mantle, whereas cations enter with runoff from the continents. It is not possible to explain all experimental facts on that basis. The authors have derived a new expression which is useful in analyzing the element composition of ocean waters and world river runoff, the objective of such an analysis being to clarify whether the salt composition of oceanic waters is a result of transport of elements from the continents or whether it is a product of differentiation of mantle matter. A table was prepared with data on the concentrations of elements in the ocean and in river runoff. It was found that the concentration of elements in both ocean and lake-river water is directly proportional to their volatilities. The cation composition of both types of waters includes products of the outgassing of the earth's deep matter released as a result of its differentiation. Despite the universality of the source, the distribution of elements in the waters of the oceans and continents conforms to different patterns. An attempt can be made to explain this difference within the framework of concepts concerning the relative youthfulness of the oceans, formed primarily by the products of outgassing of the earth's deep matter in the process of its fluctuating development or expansion. In continental runoff waters, however, a significant contribution is from the products of rock destruction. Figures 1; tables 2; references 15: 13 Russian, 2 Western.
[266-5303]

THEORY OF SOLITARY ANTICYCLONES IN ROTATING FLUID

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 5, Feb 85
(manuscript received 28 Apr 84) pp 1101-1105

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[Abstract] An earlier study analyzed a solitary wave in the form of a local thickening within which the fluid rotates in a direction opposite the rotation of the planet (anticyclonically). Such an anticyclone moves opposite the direction of planetary rotation (to the west) and is an analogue of a drift soliton in plasma. An experiment with a thin layer of fluid in a rotating parabolic vessel made it possible to produce long-live anticyclones called Rossby solitons. The laboratory studies were made with a considerable thickening of the fluid layer at the center of the eddy; in some cases the eddy scale was 2-3 times less than predicted by the theory of solitary low-amplitude waves. An effort has been made to explain this discrepancy. A study was made of a wave moving westward with the velocity u in a thin layer of rotating fluid. Equations are derived which describe solitary anticyclones moving to the west and low-amplitude waves. Analysis of the derived system shows that with a decrease in the phase velocity of a wave its amplitude decreases, the horizontal scale increases and the orbital velocity becomes close to geostrophic. It is shown that allowance for the finite amplitude of a solitary wave does not eliminate the discrepancy between theory and experiment. As a result of change in Coriolis force the eddy begins to be displaced westward. The anticyclone moves more rapidly than linear Rossby waves and can be transformed into a solitary wave. A cyclone moves more slowly than linear Rossby waves and as a result of generation of Rossby waves cannot be transformed into a stationary moving solitary wave. The difference from an anticyclone is caused by a decrease in the level in the cyclone. Due to the dispersion of Rossby waves cyclonic eddies of the scale of the Rossby radius or more decay. Strong cyclones must be regarded as nonstationary eddy formations weakly generating Rossby waves. The difference between the dynamics of a cyclone and an anticyclone is of considerable importance in the evolution of frontal rings in the ocean. This difference is manifested most clearly in eddies within the thermocline such as have been detected in recent years in different parts of the ocean. Eddies within the thermocline are anticyclones and they can be regarded as solitary internal Rossby waves. Figures 1; references 15:
10 Russian, 5 Western.
[266-5303]

19 June 1985

JDC 551.465.552

NONLINEAR MODEL OF ADAPTATION OF FIELDS OF DENSITY AND CURRENTS IN SEA

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 20, No 12, Dec 84 (manuscript received 2 Mar 83) pp 1171-1182

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[Abstract] The fields of density, wind and sea floor relief determined from observations are usually inconsistent with one another and this often results in significant errors in computation of sea currents. Accordingly, the authors have formulated a new approach in order to ensure the hydrodynamic consistency of these fields while retaining the principal advantages of diagnostic computations. In the first stage purely diagnostic computations are made. Currents are computed on the basis of a priori stipulated density, wind and bottom relief fields. A quasigeostrophic model is used as well as a nonlinear model based on primitive equations of motion. In the second stage, the adaptation stage, the system of equations and boundary conditions of the nonlinear diagnostic model are supplemented by a density diffusion equation with corresponding boundary conditions and using the initial density field and solution of the diagnostic problem as the initial approximation the computed density and current fields are brought into consistency with the observed wind and bottom relief fields. Having outlined this approach, the authors discuss the results of numerical computations carried out for the western part of the Black Sea, including the shelf zone. The studied region was covered by a uniform grid with a 5-mile interval and 12 horizons (0-1,800 m) were considered. The initial density field data were taken from a hydrological survey made in 1976. After illustrating the approach using these data, the results are compared with other models. Figures 6; references 18: 14 Russian, 4 Western.

[235-5303]

UDC 551.466.4

LABORATORY STUDY OF REGULAR LOW-AMPLITUDE GRAVITY CAPILLARY WAVES IN NONSTATIONARY CURRENT

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 4 Apr 83) pp 37-42

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[Abstract] Laboratory experiments were carried out for studying the change in wavelength, frequency and amplitude of regular low-amplitude gravity capillary waves in the range 2-5 Hz in a slow sinusoidal current with a velocity amplitude up to 10-15 cm/sec. The experiments were made in a glass flume

measuring 670 x 20 x 40 cm. A nonstationary uniform current was simulated by movement of a measurement carriage (on which a wave generator and sensors were mounted) along rails. Three electrode sensors were situated at a distance of 5, 20 and 25 cm from the wave generator. The accuracy in determining frequency and amplitude was 10 and 20% respectively; the accuracy in measuring wavelength was 10%. The generation of a current, changing with time, resulted in a change in all the parameters of the waves. Data are given for two ranges of current velocities: 10-15 cm/sec and 20-30 cm/sec. All the observations fit well within the framework of a linear kinematic model. A control experiment with a motionless carriage and a countercurrent slowly changing with time confirmed the legitimacy of transfer of the data obtained with the carriage moving relative to calm water to the case of a uniform non-stationary current. Figures 5; references: 5 Russian.
[283-5303]

UDC 551.465

EDDY FLUXES OF HEAT, VORTICITY AND MOMENTUM IN OCEAN AND ATMOSPHERE AND THEIR PARAMETERIZATION (REVIEW)

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 17 Jan 83, after revision 18 Jan 84) pp 5-18

IVCHENKO, V. O. and KLEPIKOV, A. V., Arctic and Antarctic Scientific Research Institute

[Abstract] This review, based on 39 cited sources, gives a critical evaluation of the present status of the theory of eddy transfer of momentum, heat and vorticity in the atmosphere and ocean. Despite differences in the regimes characteristic for the ocean and atmosphere, it is possible to analyze the principal ways to solve this problem on a common basis. Systematization of studies on the parameterization of vertical fluxes in macroscale circulation models suggests that four principal directions must be pursued. 1) Obtaining asymptotic solutions for model situations. (Using an expansion of the sought-for hydrodynamic functions in a small parameter it is possible to obtain solutions for the vertical fluxes of heat and momentum related to unstable baroclinic waves.) 2) Use of a diffusional scheme for the parameterization of vertical fluxes. (By "diffusional parameterization" of the vertical flux of some substance is meant the proportionality of this vertical flux to the mean gradient of the considered substance.) 3) Studies of so-called orientation effects. (Systematic, nonrandom rotations of elements of a fluid.) 4) Derivation of expressions for the zonally averaged vertical flux of momentum. (This involves hypotheses related either to the baroclinic nature of eddy formation or interaction of baroclinic waves and determination of their phase velocity.) Each of these directions (and the corresponding literature) is critically examined. References 39: 8 Russian, 31 Western.
[283-5303]

19 June 1985

UDC 551.465

STUDY OF INFLUENCE OF VERTICAL VELOCITY AND DENSITY PROFILES ON HYDRODYNAMIC STABILITY OF ZONAL FLOW

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
 (manuscript received 2 Jun 83, after revision 19 Dec 83) pp 19-25

BLATOV, A. S., and UL'YANOVA, V. I., Moscow State University imeni M. V. Lomonosov

[Abstract] Within the framework of the linear theory of hydrodynamic stability and on the basis of a three-layer model of a zonal current with transverse velocity shear a study was made of the joint influence of curvature of the vertical velocity and density profiles on the parameters of unstable wave disturbances and the findings were compared with theoretical studies made earlier and data from in situ observations. The problem is formulated as follows: there is a three-layer macroscale current (with small Rossby-Kibel' numbers $Ro \ll 1$) on the β -plane not bounded along the longitudinal coordinate X, directed to the east, and having the width L along the transverse coordinate Y, directed to the north, with the Z axis being directed vertically upward. In this formulation a system of equations is derived which is free of shortcomings present in earlier attempts to solve this problem. This makes it possible to study the influence of the vertical curvature of the density profile, related to the simultaneous existence of a seasonal thermocline and constant pycnocline, as well as the influence of curvature of the vertical velocity profile arising in the presence of subsurface velocity maxima. The system of equations is solved numerically. It is shown that the most unstable wave disturbances arise in the presence of a subsurface maximum of velocity of the main current. These findings are illustrated in computations of parameters for the main Black Sea current. Figures 4; references 13: 9 Russian, 4 Western.

[283-5303]

UDC 551.465+551.462(261.4)

FEATURES OF GEOSTROPHIC CIRCULATION RELATED TO NATURE OF BOTTOM RELIEF IN NORTHWESTERN ATLANTIC

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
 (manuscript received 25 Jul 83) pp 26-31

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[Abstract] A study was made of the influence exerted by bottom relief on a boundary current and the geostrophic circulation of the ocean in the neighborhood of its western shore. The investigation was made within the framework of the Ekman theory of wind currents in a barotropic ocean. The conditions characteristic for the northwestern shore was simulated; the sector from Florida to Georges Bank was considered. The modeling revealed that since to

the north of Cape Hatteras the depth drops off smoothly from the abyssal plain to the outer edge of the shelf almost to zero, under some conditions the isolines of the f/H function (f is the Coriolis parameter, H is depth) near the continental slope can capture the geostrophic flow, making it virtually parallel to the edge of the shelf, this resulting in the weakening and disappearance of the western boundary current. There is little basis for expecting such a strong topographic effect as detachment under baroclinic conditions, which are clearly expressed in the subtropical latitudes, particularly near the western shore (baroclinicity to a considerable degree suppresses the bottom relief effect on a current within the limits of the main thermocline). The described effect of capture of the geostrophic flow near the western shore is also possibly manifested in the South Atlantic. Figures 3; references: 10 Russian,
[283-5303]

UDC 551.465(269)

CYCLONIC FRONTAL EDDY IN ANTARCTIC CIRCUMPOLAR CURRENT

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 5 Jul 83) pp 32-36

IVANOV, Yu. A., KRASNOPEVTSEV, A. Yu., MOROZOV, Ye. G., SHADRIN, I. F.
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[Abstract] Studies of the Antarctic Circumpolar Current were made in December 1982-February 1983 on the 30th cruise of the "Dmitriy Mendeleyev" in the waters between New Zealand and Antarctica. Two hydrological surveys in the broad frontal zone of the current revealed a cyclonic eddy of the frontal type. The article discusses the structure and kinematics of the eddy and analyzes the nature of its evolution. This eddy could be traced in the field of all hydrological characteristics. Against a background of water with a temperature of about 6°C surrounding the eddy, the temperature at the center drops to 1.6°C. The horizontal scale of the ring can be determined from the peripheral closed isotherm. In the first survey the axes were 90 and 60 miles; in the second 80 and 50. During the time between the surveys (15 days) the center of the eddy moved 80 miles to the northeast, giving a velocity of 5.3 miles/day. The polar front separating the antarctic and subantarctic water structures possibly forms a meander extending to 58°S. The young ring discussed may have been formed as a result of separation of this quasistationary meander. The geostrophic velocities in the ring were computed by the dynamic method, the maximum values being 40 cm/sec. The two time-spaced surveys made it possible to compute the Lagrangian evolution of ring characteristics, specifically the available potential energy, heat and salt content. Since the mean temperature of the cold ring increased, this is evidence of its dissipation; its available potential energy increases, indicating ring intensification. As indicated by an analysis of the T, S structure, chemical and biological characteristics, the cold eddy was formed

to the southwest of the place of its detection. Then it began to move to the northeast under the influence of the mean flow and internal dynamic factors. The intensification of cold rings was observed for the first time in the ocean. It is clear that frontal eddies play a key role in the meridional exchange of properties in the interfrontal zone of the Antarctic Ocean. Figures 3; tables 2; references 3: 1 Russian, 2 Western. [283-5303]

UDC 551.464.(267.3)

ELEMENT COMPOSITION OF CHLOROFORM EXTRACTS OF DISSOLVED ORGANIC MATTER IN WATERS IN NORTHWESTERN PART OF INDIAN OCEAN

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 1 Feb 83, after revision 13 Jun 83) pp 74-79

SMIRNOV, M. B. and BORDOVSKIY, O. K., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] The composition of the "lipid" fraction of dissolved organic matter (DOM) is essentially dependent on the type of solvent used in extraction and the lesser the polarity of the solvent, the lesser will be the polarity of the extract. Most studies of DOM with low polarity have been made on the assumption that their basis is nontransformed and little-transformed lipids. The validity of this assumption has remained untested. Accordingly, a study was made to obtain some idea concerning the element composition of DOM with low polarity, its possible variations and correspondence to the composition of DOM with low polarity. The literature contains no data on the element composition of the "lipid" fraction of DOM in sea and ocean water. In addition to use of the traditional method for determining the element composition, an attempt was made of use the proton magnetic resonance method for this purpose. Chloroform extracts were taken from the waters of the northwestern Indian Ocean on the 22d cruise of the "Akademik Kurchatov." Thirty-five samples were taken from nine stations using a stainless steel bathometer. It was found that there are waters for which the fundamental assumption of a lipid composition of DOM with low polarity is not satisfied. Accordingly, a single value of the coefficient for scaling C_{org} into an absolute concentration cannot be adopted. The applicability of the proton magnetic resonance method for this purpose was demonstrated; it is highly promising because of its high response and total conservation of the sample during analysis. Figures 2; tables 2; references 18: 10 Russian, 8 Western. [283-5303]

UDC 550.4:547.9:551.351.2(47+57)

GEOCHEMICAL CHARACTERISTICS AND DIAGENETIC EVOLUTION OF ORGANIC MATTER IN
BALTIC SEA BOTTOM DEPOSITS

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 12 Jan 82, after revision 5 Sep 84) pp 80-87

DANYUSHEVSKAYA, A. I., ROMANKEVICH, Ye. A. and BELYAYEVA, A. N., Northern Production Association for Marine Geological Prospecting Work, Leningrad; Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] Joint geological and geochemical research was carried out by the Oceanology Institute in the Baltic Sea in 1978. Specialists on the 26th cruise of the "Akademik Kurchatov" took samples of suspended matter and bottom sediments from different depths of the sea. The objective was a study of the nature, geochemical characteristics and transformation of organic matter in the stages of formation of sediments and early diagenesis. The suspended matter was taken by separators from the water layer 0-7 m. Bottom samples were taken by corers. The study was based on four samples of suspended matter and 25 samples of sediments from 5 cores. Samples were taken from the Gotland and Bezymyannaya Basins and the Gulf of Riga. The composition and genetic characteristics of the sediments were determined by lithological-stratigraphic and biostratigraphic methods. For the first time it was demonstrated that the transformation of suspended organic matter is expressed not only in the loss of its most labile components, but also in an increase in the glutamic acid content of the hydrolyzable components and amino acids. The composition and distribution of amino acids, n-alkanes and polynuclear aromatic hydrocarbons are evidence of the molecular inheritance of the structure of the organic matter of sediments from suspended matter. In the sediments of the marine Holocene in the Baltic Sea basins diagenetic changes do not result in any significant change in composition of organic matter. Diagenetic transformations of organic matter have occurred most intensively in the homogeneous and varved clays of the Upper Pleistocene in the Gdansk and Gotland Basins. Genetically the general tendency of geochemical changes in the composition of organic matter with an increase in depth into the Holocene-Pleistocene sediments is expressed in a decrease in the role of the terrigenous organic component. These findings are important in understanding processes of evolution of organic matter in diagenesis and can be useful in paleogeographic reconstructions. Figures 3; tables 1; references 13: 10 Russian, 3 Western.

[283-5303]

INFLUENCE OF SOME OCEANOGRAPHIC CHARACTERISTICS ON DECAY KINETICS OF SURFACE-ACTIVE AGENTS IN SEA

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 6 May 83) pp 88-92

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[Abstract] Those parameters which constitute conditions for the vital functioning of microorganisms, such as temperature, salinity, illumination and oxygen regime, play the decisive role in processes of destruction of surface-active agents. This article gives an experimental study of the role of these marine parameters in the process of biodegradation of surface-active agents. Two methods of model research were employed in the experimental work: static laboratory modeling in open and closed glass containers and the in situ method with polyethylene or polyvinyl chloride spheres exposed during the entire experiment in the sea and supplied with valves and devices for taking samples. The object studied was the "Progress" washing compound, one of the most commonly used Soviet-produced surface-active agents, the active substance being sodium alkyl sulfate. In both the model and in the in situ experiments the rate of the process of decay of alkyl sulfates was monitored by a determination of their content in daily samples by the method of photo-colorimetry with methylene blue. A study of the kinetics of decay of alkyl sulfates in the temperature range from 0 to 36° revealed that at temperatures 0-2°C the biodestruction process is slowed down greatly. A temperature increase to 16°C results in a strong increase in the rate of destruction, but with a further temperature increase by each 10° the decay rate increases by a factor of approximately 2. The kinetics of degradation of alkyl sulfate in the insitu models varies in dependence on the content of biogenous substances and other factors causing seasonal variability of the biological activity of waters. The decay constants of surface-active agents determined in different sea areas during the spring-summer differ by a factor of approximately 2. The results are of interest in evaluating the capacity of the sea to be self-purified from surface-active agents, taking into account the spatial and seasonal variability of these factors. Figures 4; references: 10 Russian.

[283-5303]

**PHYSICOCHEMICAL PREMISES FOR USING DISPERGENTS IN CONTENDING WITH
PETROLEUM SPILLS**

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 29 Jul 82, after revision 15 Feb 84) pp 93-99

NESTEROVA, M. P., MOCHALOVA, O. S. and ANTONOVA, N. M., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] The DN-75 dispersent has undergone thorough toxicological testing with exposure to hydrobionts at different trophic levels, but the influence of dispersents on the process of self-purification of a water body, especially on the kinetics of oxidation of spilled petroleum products, has been poorly studied. With emphasis on DN-75, the article describes a laboratory study of the influence of dispersents on the rate of biochemical oxidation and degradation of petroleum products. Sea water with a salinity of 15‰ was placed in cylindrical containers and then polluted with petroleum. Then DN-75 was added to half the samples in a dispersent/petroleum ratio 1:10. The content of hydrocarbons in the samples was determined by the IR spectroscopy method at definite intervals after exposure to the light. The total quantity of losses of hydrocarbons due to different factors (evaporation, biodegradation, chemical oxidation) with and without DN-75 was determined. The samples with DN-75 revealed that the rate of petroleum decomposition increases. The exact mechanism of the effect is discussed. It is demonstrated that the surface and volumetric properties of such dispersents make it possible to reduce the thickness of a petroleum film to a minimum, destroy it and transform it into a stable emulsion, thereby restoring heat-, energy-, gas- and mass exchange of water with the atmosphere. Figures 1; tables 4; references 10: 7 Russian, 3 Western.

[283-5303]

UDC 550.834

**COMPUTATIONS OF SEISMIC WAVE PROPAGATION VELOCITIES IN OCEAN BOTTOM SEDIMENTS
FROM REFLECTED WAVES TRAVEL-TIME CURVES**

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 1 Jun 83) pp 108-112

MOSKALENKO, V. N., SEMENOV, G. A. and KUZ'MIN, P. N., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] The velocity of seismic waves in a thin layer of sediments in the ocean is usually determined using the approximate Dix formula, but the latter has a number of limitations in large part attributable to its derivation. These limitations are reviewed. In its derivation use was made only of the first two even terms in the expansion of the travel-time curve for reflected

waves. S. N. Medvedev found a more precise analytical expression for velocity which is derived using the first three terms of the expansion. The Medvedev algorithm, outlined in this article, was checked in a theoretical model and using experimental data obtained on the 28th cruise of the "Dmitriy Mendeleyev." The Dobrinskiy program was used in solving the direct seismic problem for horizontally bedded thick layers with a constant velocity and theoretical travel-time curves were computed from the bottom of sedimentary layers of different thicknesses; these theoretical travel-time curves were then introduced into a program for the inverse seismic problem. It is shown that the Medvedev algorithm makes it possible to compute the stratum velocities of propagation of seismic waves in thin sedimentary layers of the ocean with an accuracy to 0.05 km/sec. A distinct advantage of this algorithm is that there is no need to know the distances from the radiation point to the reception point. The algorithm uses only the times of two travel-time curves from the boundaries of the sedimentary layer between which it is necessary to determine the stratum velocity of seismic wave propagation. A program for computing stratum velocity in this layer was prepared on this basis. This program, in FORTRAN, has been adopted at the Oceanology Institute computer center. Figures 1; tables 3; references 4: 2 Russian, 2 Western.

[283-5303]

UDC 593.66

ROLE OF AHERMATYPIC CORALS IN SEDIMENTATION AND ECOLOGY OF CORAL BANKS

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 5 Apr 83, after revision 26 May 83) pp 113-116

KELLER, N. B., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] Ahermatypic scleractinia, not forming coral reefs, occur widely as individuals and in colonies, the skeletons in the latter being very similar to those of some hermatypic corals and being very difficult to distinguish from the latter in fossil form. Ahermatypic deep-water scleractinia are adapted to different depths as great as 6,200 m and different temperatures down to -1.1°C. Locally in the oceans they form dense colonies in the form of banks or coral overgrowths or "meadows," in the latter case playing a significant role in the formation of sediments. The largest such coral colonies form on the shelf and on seamounts: at 600-700 m on the Patagonian shelf--"Akademik Kurchatov"; Victoria Land shelf--"Ob"; Great Meteor seamount--"Vityaz". An important summary on large concentrations of colonial ahermatypic corals forming rich coral banks in the North Atlantic was given by C. Teichert in BULL. AM. ASSOC. PETROL. GEOL., Vol 42, No 5, pp 1064-1082, 1958. If such banks rise to shallow depths critical for the scleractinia the latter perish and in many cases are covered over by terrigenous sediments. The death of these corals can also be caused by changes in currents and related

changes in aeration, food supply and arrival of terrigenous sediments. The flourishing of ahermatypic colonial scleractinia, forming coral banks, requires completely different ecological conditions than for the externally similar colonial hermatypic corals capable of forming true reefs in the tropical zone. Coral banks and overgrowths in fossilized form constitute calcareous bodies of sedimentary origin: bioherms up to 60 m thick and up to 3 km in extent; there are biostromes in the form of relatively thin lenses with an extent from tens to several hundreds of meters. A study was made to ascertain how the geologist can distinguish bioherms and biostromes of abyssal, cold-water origin from tropical zone bioherms and reefs. It was found that the presence of coral bioherms and biostromes in rocks, even in the presence of rich and diversified accompanying invertebrate fauna, in itself is not an indicator of definite ecological conditions such as depth, temperature and latitude. Each individual case requires a careful analysis because these formations can arise in different bathymetric and latitude zones in the ocean. References 18: 1 Russian, 17 Russian.
[283-5303]

UDC 551.462.6(265.1)

NEW DATA ON RELIEF OF NAZCA RIDGE

Moscow OKEANOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85
(manuscript received 22 Jul 82, after revision 27 Jun 83) pp 124-129

ZAKHAROV, L. A., Zaprybpromrazvedka Administration for Fishery Exploration and the Western Basin Scientific Research Fleet

[Abstract] The Nazca Ridge is of particular interest because many aspects of the origin, development and structure of block-volcanic ridges as a whole do not fit in with the hypothesis of the tectonics of lithospheric plates. In addition to data from earlier work, this study of the Nazca Ridge is based on 24 computer-processed profiles of the ridge with a total extent of more than 2,500 miles (all available data were used in compiling a bathymetric chart of the region, Fig. 1). Four principal parameters were determined: slope, horizontal and vertical dissection, mean depth level. The area discussed extends from 17°S, 77°30'W to 26°S, 86°W. The Nazca Ridge, like the Walvis Ridge in the Atlantic, is broken into large macroblocks: northern (15-19°S); central (19-23°S); southern (23-26°S). Each is distinctly different. The northern macroblock has a base at a considerable depth, minimum elevation and minimum vertical dissection. The central macroblock rises to the greatest elevations above the surrounding Peruvian and Chilean Basins, has considerable vertical dissection and a maximum slope steepness. There are mountains of typical volcanic characteristics, some with flat tops. The distinguishing characteristic of the southern macroblock is a predominance of mountains of volcanic origin, many of which are typical guyots, evidence of a relatively recent sinking of this part of the Pacific Ocean floor. It

appears that the structure of the Nazca Ridge has a different genesis in its different parts. Between 15 and 23°S there is a massive block structure, possibly of horst origin. The structure of the sector to the south of 23° is predominantly of volcanic origin. Figures 2; references 13: 8 Russian, 5 Western.

[283-5303]

TERRESTRIAL GEOPHYSICS

GEOPHYSICS CONFERENCE FOCUSES ON MINERAL PROSPECTING

Leningrad LENINGRADSKAYA PRAVDA in Russian 28 Mar 85 p 1

[Article by V. Vasil'yev]

[Text] More than 200 specialists from dozens of scientific research institutes and geological surveying organizations took part in the All-Union Scientific-Technical Conference of Geophysicists which was held in Leningrad.

Geophysical methods of prospecting and surveying mineral resources have been receiving broader and broader use in recent years. Study of magnetic, gravitational and electric fields and other physical fields has become a reliable aid to geologists in their work.

Participants in the conference devoted particular attention to the development of new methods and geophysical work. Questions of heightening the sensitivity of instruments and automating prospecting processes held the center of attention at the conference. Principal ways of accelerating technological progress in the field of geophysical studies for the 12th 5-Year Plan were determined at the conference.

FTD/SNAP
CSO: 1865/303

GROUND-WATER DETECTING UNIT "GIDROSKOP"

Moscow NTR: PROBLEMY I RESHENIYA in Russian 5-18 Mar 85 p 2

[Text] A fundamentally new unit for directly detecting and assessing water underground without the drilling of boreholes has been developed at the Institute of Chemical Kinetics and Combustion of the USSR Academy of Sciences' Siberian Branch. This unit, which has been given the name "Gidroskop", "sees" water at depths as great as 100-150 meters.

Operational efficiency and the low cost of information that is obtained are the unit's principal merits. It is particularly valuable when used for prospecting thawed water-bearing layers between layers of frozen ground.

(A photograph was given showing A. V. Legchenko, senior engineer of the Institute of Chemical Kinetics and Combustion, debugging a new program for processing results of measurements with the "Gidroskop".)

FTD/SNAP
CSO: 1865/328

GRAVIMETRIC SURVEYING WITH MI-8 HELICOPTERS

Moscow VOZDUSHNYY TRANSPORT in Russian 18 Apr 85 p 4

[Article by V. Sopolev]

[Text] A new type of geophysical operation--gravimetric surveying from MI-8 helicopters with the aid of suspended gravimeters--has been mastered for the first time in the country by Far East helicopter crews. In this method, all work is performed by an operator inside a helicopter carrying a gravimeter on an outside sling. The gravimeter is equipped with a stabilizing device.

Work with the suspended gravimeter requires considerable flying skill and highly precise piloting during approaches and hovering. Not without reason was this work assigned to crews of the team headed by Vladimir Vasil'yevich Muzyka, one of the most experienced pilots and a Hero of Socialist Labor.

FTD/SNAP
CSO: 1865/328

UNDERGROUND CONDITIONS NEAR KISHINEV MONITORED

[Text] 19 Mar [TASS] A high-precision station for monitoring underground conditions has been built in one of the old mines near Kishinev, with up-to-date geophysical instruments on round-the-clock watch.

A seismological research headquarters has been situated in a stone labyrinth 1.5 km long at great depth, whence run very fine conductors to various parts of the mine-like tentacles. Diverse information returns along these from tens of sensors to the registering instruments.

These include a unit measuring ground and atmospheric electricity, which takes measurements every twenty minutes--twice as frequently as usual. This mode has been selected in order to obtain fuller information.

The complex could not function efficiently on the Earth's surface - its readings would be affected by various obstacles: rain, for example, or electric wires which have fallen to the ground.

The center includes apparatus for monitoring changes in the earth's magnetic field. The instruments are very sensitive to temperature changes and the old mining gallery is therefore an ideal place, as it is not subject to such changes, and the earth layer above the mine protects the station from magnetic barriers.

It is planned to install an underground computer with a signaling system for recognizing catastrophic earthquakes at the first earth tremor from the Carpathians, the cradle of many underground upheavals. This will enable electricity grids to be switched off and the population to be warned before the tremors.

A seismic data bank created in the republic is of great help in forecasting earthquakes. The computers store information on underground squalls which have taken place in the Carpathian-Balkan region since the beginning of the century.

CSO: 1865/287

FRUNZE UNDERGROUND GEOSEISMIC LABORATORY

[Article: "Seismology in Soviet Kirgizia"]

[Text] Frunze, 15 Mar [TASS]. An underground geoseismic laboratory has been set up near Frunze. Its aim is to help to predict earthquakes by registering changes in magnetic fields, the electrical resistance of the ground and the chemical and gas content of subterranean waters. Seismic study of the Tien Shan is now so advanced that the epicenters and force of impending earthquakes can be predicted. Specialists have concluded that the epicenters of earthquakes are moving along faults in the earth's crust and that tectonic changes move in 100-year cycles.

Seismologists have established that along the two major Central Asian faults - Gisaro-Kokshaal and Darvaz - Karaku, the rate of the underground movement is 4-5 km per year, and 30 mobile seismic, geomagnetic, electrometric and seismogeochemical stations monitor these areas of possible earthquakes.

In recent years no earthquake in the Tien Shan has come as a surprise, so timely evacuation of people and damage limitation has been possible.

CSO: 1865/288

DEEP-LEVEL GEOLOGICAL PROBING WITH MHD GENERATOR

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Apr 85 p 4

[Article by V. Proshkin]

[Excerpt] The Barents Sea was still covered with early-morning mist when the command "Launch!" rang out, and the roar of rocket engines was heard on the shore. On this occasion, however, scientists needed rockets not for a flight into space but, on the contrary, for a 'trip' underground.

"These solid-fuel rockets are part of a powerful magnetohydrodynamic unit," related Doctor of Physical-Mathematical Sciences M. Zhdanov, head of the department of the deep-level electromagnetic studies of the USSR Academy of Sciences' Institute of Earth Magnetism, the Ionosphere and Propagation of Radio Waves (IZMIRAN). "Academician Ye. Velikhov suggested that electromagnetic probing of the Earth's interior be conducted with the aid of such a unit. The energy of ionized gas bursting from the rockets' nozzles is converted into electric current and reaches a tremendous intensity during the seconds that the generator is in operation. Two aluminum cables run down into the sea from both sides of the narrow isthmus that connects the Sredniy Peninsula with the mainland portion of the Kola Peninsula. These grounding electrodes, which are separated by a distance of about 10 kilometers, form a gigantic 'fork' that literally plugs the MHD generator into the sea."

"In a brief period of time, the MHD generator developed an enormous power--up to 40,000-60,000 kilowatts," explained M. Zhdanov.

"Calculations made by associates of the Geology Institute of the USSR Academy of Sciences' Kola affiliate and the Institute of Atomic Energy imeni Kurchatov indicate that even in the most dangerous place, right next to the grounding electrodes, the density of current in the sea does not exceed the permissible level that is harmless to living organisms. Moreover, the generator does not operate for long--no more than 10 seconds."

Processing of the initial results already has made it possible to draw an unexpected conclusion. It has been found that the Kola Peninsula is composed not of a single crystalline shield but mostly of 10 large blocks, and that the conductance of sedimentary rocks on the coasts of the peninsula is far greater than was previously supposed.

In order to reveal all of the practical advantages of using MHD generators in geology, a large group of scientists headed by Academician Ye. Velikhov had to accomplish a considerable number of difficult tasks, including the creation of a new base for measurements and quite different methods for theoretical analysis and interpretation of results. Lastly, the size and shape of the field that the MHD generator would create had to be determined prior to the experiment. A major role in this work was played by scientists of the Institute of Atomic Energy imeni Kurchatov, the Geology Institute of the USSR Academy of Sciences' Kola affiliate, IZMIRAN, and the USSR Academy of Sciences' Special Design Bureau of Physics Instrument building.

Laboratory modeling of the experiment with a miniature copy of the Kola Peninsula was of great importance for interpreting the experimental data.

"We replaced the sea with a metal plate and the land with materials that are poor conductors," related Candidate of Physical-Mathematical Sciences A. Lisin, head of a laboratory of the Institute of Atomic Energy imeni Kurchatov. "In place of the MHD generator, we used an ordinary current rectifier connected to a power supply system."

The "Khibiny" experiment is continuing. A test area is being operated on the Kola Peninsula. New level electromagnetic probing are being tested here.

FTD/SNAP
CSO: 1865/303

UDC [550.382.549.01]:622.24(479.24)

MAGNETIC MINERALS AND CHARACTERISTICS OF NATURAL MAGNETIC STATE OF CORE IN
SAATLY SUPERDEEP HOLE IN DEPTH RANGE 3500-7500 m

Baku IZVESTIYA AKADEMII NAUK AZERBAYDZHANSKOY SSR, SERIYA NAUK O ZEMLE
in Russian No 5, 1984 pp 61-67

BAGIN, V. I. and NOVRUZOV, Z. A.

[Abstract] The SG-1 Saatly superdeep hole is one of the 15-km holes being drilled or which will be drilled for studying the deep structure of the earth's crust. Special geological-geophysical and geochemical studies of the core from the Saatly hole are now in progress, directed to investigation of the mineralogical composition of the rocks, conditions of their origin for clarifying the nature of geophysical boundaries and detection of ore shows. This article presents data on magnetic minerals, carriers of natural remanent magnetization and determinations of the conditions under which they originated. Core rocks from depths of 3,500-7,500 m were used in the study. These are andesites, andesite-basalts, basalts, dacites and others (a total of 120 samples were analyzed). The samples were selected on the basis of a preliminary petrographic analysis. Data on Curie temperatures (T_C) and other parameters were analyzed in depth. The constancy of the composition of magnetic minerals (magnetite with $T_C = 575-585^\circ\text{C}$, magnetite with a low content of titanium with $T_C = 520-550^\circ\text{C}$ and oxidized magnetite with $T_C = 600^\circ\text{C}$), found in the entire studied depth range, and its stability to temperature effects indicate not only a predominance of high-temperature oxidation, but also a constancy of conditions at the source of removal of the material. It is clear that the magnetic properties of the rocks are related primarily to large grains whose size can vary from a few microns to hundreds of microns. This is evidence of relatively calm depth conditions of their crystallization with subsequent high-temperature oxidation. A rapid cooling of the rocks with the manifestation of low-temperature oxidation is possible for individual horizons in the core. Tables 1; references:
6 Russian.
[265-5303]

19 June 1985

UDC 550.834.05

NEW METHODS FOR INTERPRETING SEISMIC WAVES IN STRATIFIED MEDIA

Moscow GEOLOGIYA NEFTI I GAZA in Russian No 1, Jan 85
 (manuscript received 6 Jul 84) pp 48-53

LUTSENKO, B. N., Geological Prospecting for Petroleum Institute

[Abstract] In order to ensure the most complete exploitation of petroleum deposits it is essential to develop new methods for the study of faults and the steep slopes of salt domes. The author describes a method for achieving this goal. This involves interpretation of reflections directly from fault zones: direct waves from the boundaries of fault zones and doubly reflected waves (those forming first by reflection from a subvertical boundary and then from the subhorizontal boundaries adjacent to them). It is shown that the formation of such duplex waves does not require that the entire subvertical boundary be continuously reflecting; it is only required that its individual elements in the neighborhood of the contacts with the subhorizontal boundaries have reflecting properties. The dynamics and kinematics of formation of these dual waves were examined in earlier studies by the author (EI VIEMS: SER. REGIONAL'NAYA I RAZVEDOCHNAYA GEOFIZIKA, Moscow, No 18, pp 14-22, 1979; No 13, pp 25-36, 1980). The discrimination and interpretation of such waves is possible in virtually the entire range of studied depths for seismic prospecting and petroleum exploration and also in deep seismic soundings. Each of these possibilities is illustrated in examples. For example, the new method can be applied in detecting subvertical contacts in the search for structurally screened petroleum and gas deposits and salt domes in the Dnieper-Donets and Caspian regions. Figures 4; references: 5 Russian.
 [273-5303]

UDC 550.34.001.13

NEW APPROACH TO SOME PROBLEMS IN SEISMOLOGY

Baku IZVESTIYA AKADEMII NAUK AZERBAYDZHANSKOGO SSR, SERIYA NAUK O ZEMLE
 in Russian No 5, 1984 pp 41-46

KERIMOV, I. G.

[Abstract] Profound changes have occurred in seismology in recent years with respect to certain concepts which earlier had been unquestioned. Among these concepts are those regarding the pattern of distribution of earthquakes, the theory of propagation of weak high-frequency signals and the mechanism of induced seismicity. Each of these topics is discussed. For example, it has been generally accepted that the curve of the dependence of the number of earthquakes on their magnitude has a shape close to a hyperbola: the stronger an earthquake, the less frequently it occurs. But 72% of all

earthquakes are plotted in depth to depths of 400-450 km with an interval of 10 m earthquakes with $M = 4.8-4.9$ are most characteristic in all depth intervals. This casts a new light on the subject. In such a distribution the stratification of the upper part of the earth plays the most important role in a seismogenic sense. Since $M = 4.8-4.9$ corresponds to blocks measuring 12-15 km, layers alternate specifically with such a periodicity. In seismogenic respects the earth is homogeneous both over its surface and in depth. A study of weak seismic fields during the time directly preceding earthquakes has revealed definite amplitude and frequency changes in the process of preparation for the main earthquake tremor. There is a characteristic dropoff in the amplitude level before the process begins to intensify continuously, up to the time of occurrence of the main tremor. Attenuation of the seismic field is observed at any distance from the focus (everywhere on the earth's surface). This attenuation can serve as a prognostic criterion because it is observed in all frequency ranges with definite time intervals. During the first period of radiation of microseisms by the focus there is an interaction between the medium and the field of weak oscillations at each stipulated surface point, this being characterized by a general drop off of field energy. The process is later stabilized, followed by a continuous increase in amplitudes up to total discharge of focal region energy. New revelations concerning the correlation of weak seismic fields and electromagnetic radiation during the period of direct preparation for an earthquake and concerning induced seismicity are leading to substantial revision of concepts concerning planetary seismicity. Figures 2; [265-5303]

UDC 550.372

METHOD FOR SOLVING PROBLEMS IN ELECTRODYNAMICS OF ANISOTROPIC MEDIA WITH SLANT BEDDING

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 2, Feb 85
(manuscript received 6 Jun 83) pp 75-82

SAVIN, M. G., Computer Center, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] This is a further development of the methodology for solution of electrodynamic problems for the case of gradient anisotropic media when the axes of the medium form quite small angles with the surface. This model approximates the geoelectric situation in the crystalline structures of the Baltic shield, where there is a contancy of the tilt of ancient rocks at angles from 45 to 60° to a depth of 11 km. The problem is examined in relation to work with pulsed magnetohydrodynamic generators. A geoelectric structure containing one-dimensional anisotropic layers is considered. The structure is assumed to be uniaxial, with the dielectric constant and magnetic permeability being continuous functions only of the z-coordinate. A method for solving electrodynamic problems is given for such media (the

19 June 1985

generalized functions method is employed). A fundamental solution is given for a system of Maxwell equations, represented in the form of a convergent series, whose terms are computed using recurrent formulas.

References: 15 Russian.

[290-5303]

UDC 550.344.094+550.347.24

FEATURES OF FIELD OF DIRECTIONS AND VELOCITIES OF PROPAGATION OF FRACTURES AT EARTHQUAKE FOCI IN NORTHERN MUYA REGION OF BAYKAL RIFT ZONE

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 1, Jan-Feb 85
(manuscript received 10 May 83) pp 98-105

SOLONENKO, A. V. and SOLONENKO, N. V., Earth's Crust Institute, Siberian Department, USSR Academy of Sciences

[Abstract] In an earlier article (VULKANOLOGIYA I SEYSMOLOGIYA, No 4, pp 79-92, 1983) the authors proposed a method for determining the directions and velocities of propagation of fractures at the foci of earthquakes which is based on a joint analysis of their mechanism and the distribution of apparent periods at seismic stations in the region. The method has now been applied to the Baykal rift zone, specifically the Northern Muya region, within which there is an inversion of the field of directions of fracture propagation. The characteristics of this region are discussed in detail; Fig. 1 is a map showing the field of directions of fracture propagation at earthquake foci in the Baykal rift zone, with the studied area clearly set off; Fig. 2 gives corresponding information for the study area. In this area the velocities and directions of fracture propagation were determined at the foci of 247 earthquakes. In the analysis the data were classified into three groups: 1) those foci at which the direction of fracture propagation has a westerly component; 2) those with an easterly component; 3) those for which the direction of propagation could not be ascertained with certainty. The four characteristic zones were defined. These analyses revealed that the Northern Muya region is actually a place where there is a reorientation of the directions of fracture propagation. The change in direction occurs in the neighborhood of the Pereval'nyy fault. Whereas in zone I most of the foci have a westerly component, in zone II the relationship between the number of foci with different directions is evened out. With transition to zone III a great many foci already have an easterly component, but there is still a high percentage of foci with the opposite direction. In zone IV most earthquakes have foci with an easterly component. It is between zones II and III (Pereval'nyy fault) that the inversion of the field of directions occurs. Figures 4; tables 2; references: 4 Russian.

[291-5303]

UDC 551.21

PETROLOGY OF PRODUCTS OF ERUPTION OF KLYUCHEVSKIY VOLCANO (PREDSKAZANNYY OUTBURST, 1983)

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 1, Jan-Feb 85
(manuscript received 9 Mar 84) pp 47-70

KHRENOV, A. P., ANAN'YEV, V. V., BALUYEV, E. Yu., LITASOV, N. Ye. and OZEROV, A. Yu., Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] During the lateral eruption of Klyuchevskiy volcano in March 1983 lava periodically gushed from an eruptive center at an elevation of 2,875 m and flowed downslope. More than 0.15 km³ of lava of basaltic composition was ejected. Genetically this lateral breach, called the Predskazannyy outburst, can be classified as a lava bocca. A thorough analysis of the products of this eruption revealed that the mineral composition of the phenocrysts of dark-colored minerals, like for the 1st-generation plagioclase, remained constant during the course of the entire eruption. However, in the final stage of the event (when the lava flow was minimal) there was an increase in the quantity of 2d-generation plagioclase. The 1st-generation plagioclases, clinopyroxenes and olivine phenocrysts were subliquidus phases crystallizing at temperatures of about 1100°C, at pressures no greater than 2.5 kbar and with a fugacity of oxygen between $1.73 \cdot 10^{-11}$ and $1.35 \cdot 10^{-9}$. The crystallization of phenocrysts of 2d-generation plagioclases and most of the phenocrysts of olivine and pyroxenes was at a temperature of about 1090°C and a pressure of 3.0-3.5 kbar at the time of separation of the gas phase from the melt. The constancy of the chemical composition and mineral associations of phenocrysts and microlites during the eruption indicates absence of any crystallization-gravitational differentiation in the volcanic duct. It was noted that in the clinopyroxenes there is a positive correlation between the content of aluminum-titanium and iron-manganese and a negative correlation between calcium-magnesium and aluminum-magnesium. Figures 12; tables 8; references 37: 24 Russian, 13 Western.

[291-5303]

UDC 550.81:535.37:549.742(477)

USE OF LUMINESCENT CHARACTERISTICS OF CARBONATES IN SEARCH FOR CARBONATITES

Kiev GEOLOGICHESKIY ZHURNAL in Russian Vol 45, No 2, Mar-Apr 85
(manuscript received 31 Jan 84) pp 74-82

KOROL', R. F., KUL'CHETSKAYA, A. A. and TARASHCHAN, A. N., Geological Sciences, Institute, Ukrainian Academy of Sciences, Kiev; Geochemistry and Mineral Physics Institute, Ukrainian Academy of Sciences, Kiev

[Abstract] A study was made of the roentgenoluminescence spectra and thermoluminescence curves of carbonates in order to clarify the typomorphic criteria which can be used in the classification of rocks containing carbonates in the Sea of Azov region. Rock-forming carbonates (calcite, dolomite and mixtures of calcite and dolomite) from rare-metal carbonatites were studied, as well as fluorite-carbonate veins and nonore marbles and calciphyres. It was found that carbonatites and the calciphyres which closely resemble them can be distinguished using such luminescence criteria as the type of curve and intensity of thermoluminescence of carbonates and the parameters of the roentgenoluminescence spectrum of carbonates and apatite (distribution of the Mn^{2+} , Ce^{3+} , Eu^{2+} , Dy^{3+} emission bands). Carbonatites are characterized by two types of curves of thermoluminescence of carbonatites with a ratio of intensities of thermoluminescence peaks $I_{T_3}/I_{T_2} \geq 1$, whereas calciphyres always

have the same type of curve with $I_{T_3}/I_{T_2} \geq 1$. Carbonatites have a very low intensity of thermoluminescence of carbonates and complex roentgenoluminescence spectra of carbonates and apatite caused by the superimposition of emissions of rare earth elements on the Mn^{2+} emission. Calciphyres have a higher intensity of thermoluminescence of carbonates and a simple spectral composition of emission of carbonates and apatite. A distinguishing characteristic of calciphyres is also a stability of the shape of the curve and intensity of thermoluminescence of carbonates, this reflecting the constant conditions for their formation. The fluorite-carbonate veins with respect to the luminescent properties of carbonates are close to the late generations of carbonatites containing rare earth mineralization. Figures 5; tables 1; references 16: 15 Russian, 1 Western.

[302-5303]

UDC: 550.4:550.42:551.35

ISOTOPE ZONALITY OF KURIL ISLAND ARC BASED ON RESULTS OF STUDIES OF
 $^{143}\text{Nd}/^{144}\text{Nd}$ and $^{87}\text{Sr}/^{86}\text{Sr}$ RATIOS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 2, Jan 85
(manuscript received 26 Apr 84) pp 486-491

ZHURAVLEV, D. Z., ZHURAVLEV, A. Z. and CHERNYSHEV, I. V., Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry Institute, USSR Academy of Sciences, Moscow

[Abstract] A study was made of the isotope composition of neodymium and strontium in the lavas of volcanoes on the frontal and rear zones of the Kuril Island arc over practically its entire length. The rocks studied included subalkaline olivine basalts and reflected the overall composition of products of Quaternary volcanism in the area. Neodymium and strontium were analyzed on a mass spectrometer. The frontal and rear zones of the island arc are clearly differentiated based on isotope characteristics of neodymium and strontium, with a decrease in $^{87}\text{Sr}/^{86}\text{Sr}$ and $^{143}\text{Nd}/^{144}\text{Nd}$ upon transition from the frontal to the rear zone. The contribution of crustal material to the formation of the isotope composition of neodymium and strontium in Quaternary volcanites is negligible, meaning that the measured values of isotope ratios are quite close to the values in the upper mantle beneath the island arc. Figures 2; tables 1; references 11: 7 Russian, 4 Western. [232-6508]

UDC: 553.33:550.382:3

INTERRELATIONSHIP OF PHYSICAL PARAMETERS OF INTRUSIVE ROCK IN DEEP ZONES OF CRUST IN NORTHWEST KOLA PENINSULA

Kiev GEOFIZICHESKIY ZHURNAL in Russian Vol 6, No 6, Nov-Dec 84
(manuscript received 18 Feb 84) pp 75-78

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[Abstract] Results are presented from processing of the density-magnetic susceptibility correlation fields of ultrabasic intrusive rock in the Lotinskiy block adjacent to the Pechenga and Allarechenskiy regions. Mathematical-statistical methods are used to describe the stochastic relationships between density and magnetic susceptibility of these ultrabasites (peridotite and pyroxenite series) and gabbroids. The relationships are applicable to the entire northwest Kola Peninsula. Changes in regression equations are calculated for various depths by modeling the magnetic parameters of the titanomagnetite contained in the deep crustal rocks. A regression equation is also derived for the

relationship between density and elastic wave propagation velocity and a correction is introduced for the effects of high pressure. The regression equations are compared with those obtained for similar rocks of other regions, such as the central Kola Peninsula, the Ukrainian shield and the Middle Urals. Tables 2; references: 6 Russian.
[189-6508]

UDC: 551.243.4(571.66)

SCALE-OVERTHRUST STRUCTURE OF NORTHERN PART OF EAST KAMCHATKA ANTICLINORIUM

Moscow GEOTEKTONIKA in Russian No 6, Nov-Dec 84
(manuscript received 23 May 83) pp 84-93

SHAPIRO, M. N., SLYADNEV, B. I. and LANDER, A. V., Earth Physics Institute imeni O. Yu. Shmidt, USSR Academy of Sciences; "Kamchatgeologiya" Geological Production Association

[Abstract] This article, based on materials obtained on Kumroch Range and to a lesser extent on Karaginskiy Island, gives a description of the structure of the northern part of the East Kamchatka Anticlinorium and discusses problems related to the kinematics and dynamics of its formation. The upthrusts and folds were formed in the Early Paleogene over a subhorizontal fracture zone probably resulting from movement of basement blocks to the northwest. The structural basis of the East Kamchatka Anticlinorium is steep scaled overthrusts. Most of the scales consist of compressed folds, frequently tilted to the east. Oligocene and Miocene movements were less intensive than in the early Paleogene, reaching their maximum amplitude in the neighboring synclinorium to the southeast.
Figures 4; references 17: 14 Russian, 3 Western.
[186-6508]

UDC: 550.834.08:551.462.54

STRUCTURE OF HEEZEN FRACTURE IN SOUTHEAST PACIFIC (BASED ON REFLECTED WAVES METHOD-DEEP SEISMIC SOUNDING)

Moscow BYULETEN' MOSKOVSKOGO OBSCHESTVA ISPYTATELEY PRIRODY: OTDEL GEOLOGICHESKIY in Russian Vol 59, No 6, Nov-Dec 84
(manuscript received 2 Jun 82) pp 25-31

KOGAN, L. I., GOL'MSHTOK, A. Ya., ZONENSHAYN, L. P. and SOROKHTIN, O. G., Southern Division, Oceanology Institute, USSR Academy of Sciences, Gelendzhik; Oceanology Institute, USSR Academy of Sciences, Moscow

[Abstract] Processing and interpretation of reflected waves method-deep seismic sounding data obtained during the 24th cruise of the research vessel

"Akademik Kurchatov" in 1977 in the Southeast Pacific ($54^{\circ}30' - 55^{\circ}45'S$, $124^{\circ}30' - 127^{\circ}00'W$) revealed the structure and microstructure of the oceanic crust along the Heezen fracture and established that local components of compression here are decisive in the formation of the bottom relief and structural forms of the major crustal layers. The seismologic cross-sections indicate that the structure of the crust near the Heezen fracture is typical for the ocean floor. The petrographic structure is described in general terms. The studies indicate compressive structures. The Pacific lithosphere plate with its thicker crust (up to 10 km) overthrusts the Antarctic plate with a thinner crust (7 km). As a result, a depression with an amplitude of 1.5-2 km has arisen along the compressive axis and on the southern limb there is an underwater ridge over 5 km high. Thin amphibolic shales have been formed under the compressive conditions in a narrow zone of the transformed Heezen fracture due to dynamometamorphism. The compression conditions probably arose due to incomplete matching of the orientation of the fracture with the direction of movement of the Pacific and Antarctic plates in this region. Figures 3; references 12: 10 Russian, 2 Western.
[190-6508]

UDC: 551.735(2-925.22-11)

NEW DATA ON CARBONIFEROUS STRATIGRAPHY OF EASTERN MARGIN OF CASPIAN DEPRESSION

Moscow BYULLETEN' MOSKOVSKOGO ORSHCHESTVA ISPYTATFLEY PRIRODY: OTDEL GEOLOGICHESKIY in Russian Vol 59, No 6, Nov-Dec 84
(manuscript received 25 Mar 82) pp 90-102

AKHMETSHINA, L. Z., BULEKBAYEV, Z. Ye., VAKULA, L. I., KALMYKOVA, A. G., KUKHTINOV, D. A., MARCHENKO, O. N., SANINA, L. V. and YUL'METOV, Sh. F., Kazakh Scientific Research and Geological Prospecting Institute, Aktyubinsk

[Abstract] In the past few years, Carboniferous strata have been found in boreholes in many areas in the eastern Caspian depression. Deposits of varying stratigraphy have been found immediately beneath the Dokungur Lower Permian. Three structural zones have been founrn, the Kenkiyakskaya, Tortkol'skaya and Zhanazhol'skaya zones. The stratigraphy of each of these three zones is described in detail. A diagram illustrates the sequence and thickness of the deposits in each of these three zones. Figures 2; references: 10 Russian.
[190-6508]

UDC: 550.822.6/.7(268.45+268.52)

PARAMETRIC WELLS ON ISLANDS IN BARENTS AND KARA SEAS

Moscow SOVETSKAYA GEOLOGIYA in Russian No 1, Jan 85 pp 95-98

GRAMBERG, I. S., SHKOLA, I. V., BRO, Ye. G., "Sevmorgeologiya" Geological Production Association, and SHEKHODANOV, V. A. and ARMISHEV, A. M., "Volgokamskgeologiya" Geological Production Association

[Abstract] Geological prospecting work including drilling of parametric boreholes is in progress on the shelf of the Arctic Ocean. The major task of the drilling is to determine the age, material composition and physical properties of rocks making up large geostructural elements of the island masses and adjacent shelf. Five boreholes have been drilled to date. Each of these wells is briefly described. As a result of processing of materials from the wells, information has been obtained for the first time on the structure of the sedimentary cover and folded basement, as well as magmatism in the shelf edge upthrust zone of the Barents Sea. It has been established that between the Early Carboniferous and Early Cretaceous this zone developed as a young platform. The sedimentary cover of the platform is homogeneous in terms of type of sediment, facies makeup, periods of tectonic activity and manifestations of trapped magmatism. One peculiarity of the zone is the small thickness of deposits in the early stages of katagenesis. The terrigenous rock at shallow depths therefore has high density and high elastic wave propagation velocity. The cross-section of Mesozoic deposits in the southeastern part of the Kara Sea shelf is similar to cross-sections of rocks of the same age in northwestern Siberia, differing in having generally greater sandiness. The metamorphic rock penetrated by the wells is comparable to the Lower Proterozoic formations of western Taymyr. Figures 1.

[253-6508]

UDC: 550.348.433

SPECTRAL PRECURSORS OF PETROPAVLOVSK EARTHQUAKE OF 24 NOVEMBER 1971

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 12, Dec 84 (manuscript received 21 Sep 83) pp 25-35

ZOBIN, V. M. and CHIRKOVA, V. N., Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] This article continues a series of studies devoted to the search for spectral precursors of strong earthquakes and eruptions on Kamchatka. The article describes variations in spectral characteristics of P waves of weak earthquakes in the vicinity of the focus of the Petropavlovsk earthquake of 24 November 1971, one of four very strong earthquakes in Kamchatka over the past twenty-five years. Anomalies in the spectral composition

of P waves were observed with a 99% confidence level for four years before the main shock. The contradictory nature of detected spectral precursors of strong earthquakes is attributed to the specifics of the physical structure of the medium in which the strong earthquake is prepared. At the present stage of research of spectral precursors there is no model capable of explaining the anomalous nature of changes in mean values of fault stresses at the foci of weak earthquakes in the area where a strong shock is being prepared. However, since in practically every case investigated a significant anomaly is observed in the behavior of the spectral precursor, the authors are convinced of the necessity of continuing research in this direction. It is hoped that additional data will yield a model of the spectral precursors of strong earthquakes. Figures 6; tables 3; references 16: 10 Russian, 6 Western.
[225-6508]

UDC: 550.34.7;551.242.11;551.461.2

VERTICAL MOVEMENTS OF CRUST IN KURIL ISLANDS IN RELATION TO EARTHQUAKE

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 12,
Dec 84 (manuscript received 2 Dec 82) pp 95-101

NIKONOV, A. A. and YAKUSHKO, G. G., Earth Physics imeni O. Yu. Shmidt,
USSR Academy of Sciences; Sakhalin Complex Scientific Research
Institute

[Abstract] Geological-geomorphological studies in the coastal zone and sea level observations are particularly important in the study of contemporary vertical movements of the Kuril Islands crust due to the limited capabilities of the repeated high-precision leveling method. Two groups of observations made at the same points were used for mutual testing and determining possible nonuniformity of movement during various time intervals. An attempt was made to determine the long-term trend of movement at each point studied and where possible to determine temporary disturbances, which were then compared with the occurrence of strong earthquakes. Most of the points examined on the Kuril Islands appear to have undergone upthrusting over the past thousand years at 0.25-2.0 mm/yr. Subsidence was observed along the east coast of Shikotan Island. Varying degrees of correlation of movement over the past decade were observed at different points. In some cases these recent movements were found to agree with, in other cases to be in the opposite direction from, the long-term movements. This may be attributable to appearance of rapid oscillating movements related to strong earthquakes. Figures 2; tables 1; references 12: 8 Russian, 4 Western.
[225-6508]

UDC: 55.51

HARDWARE AND SOFTWARE SUPPORT OF GEOLOGICAL-GEOPHYSICAL DATABASE

Novosibirsk AVTOMETRIYA in Russian No 6, Nov-Dec 84
(manuscript received 20 Jun 84) pp 82-83

IVANOV, V. A., IVANCHENKO, G. A., KARLSON, N. N. and YAKOVENKO, N. S.,
Novosibirsk

[Abstract] The greatest difficulty in processing of geological and geophysical data on computers is that of representing the data on punch cards. This report describes the first version of a geological-geophysical database and the software which allows input and output, storage, editing and analysis of the data jointly with pictures. Coded graphic information is transferred from cards to magnetic tape and output is through a plotter. The objects in the database are various points on coded maps. An object has three attributes: a characteristic (reference point, isoline, profile, linearment, etc.), value of geological-geophysical quantity (e.g., temperature in borehole) and coordinate of the point coded. The database is physically kept on 7.5-Mb magnetic disks using FMS-10 and FMS-D file management systems under DOS-10 on a YeS-1010 minicomputer. The first part of the geological-geophysical database allows coding, storage and editing of geological-geophysical maps, reduction of the maps to a common topographic base, as well as geometric transformation of photographic images to the same topographic base, allowing work to be started on combined analysis of data and photographs. References: 6 Russian.

[262-6508]

UDC: 550.834:551.234(571.642)

USE OF SEISMOSTRATIGRAPHY IN OIL AND GAS PROSPECTING STUDIES ON NORTHERN SAKHALIN

Novosibirsk TIKHOKEANSKAYA GEOLOGIYA in Russian No 5, Sep-Oct 84
(manuscript received 25 Apr 83) pp 16-21

KONONOV, V. E., LOPATNEV, Yu. V., SLUDNEV, Yu. G. and KHARAKHINOV, V. V.,
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[Abstract] Northern Sakhalin is one of the oldest oil- and gas-producing regions in the country, but contains a great deal more oil and gas. Geological and geophysical materials of recent years indicate significant differences in the structural plan of various Neogene masses in northern Sakhalin. These peculiarities of structure have created unique types of hydrocarbon traps, buried horst upthrusts of clay and sand deposits. Search for these traps is now underway by the reflected waves seismic prospecting method. Geological-geophysical studies at present are directed toward detailed analysis of the structural plan of the Middle Miocene-Pliocene

deposits. Seismostratigraphic studies have revealed that the base of the mass of deposits containing hydrocarbon traps consists of a combination of horsts and grabens in the western edge of the northern Sakhalin depression. Local traps form extended zones, consisting of a combination of a graben with hemianticlinal and monoclinal upthrusts. The depths of the deposits vary between 2,000 and 4,200 m. The objective of the studies is to establish a relationship between wave field characteristics and lithology of the Neogene cross section and to locate characteristic seismic facies which are potentially oil and gas bearing. The stratigraphic evidence indicates the presence of one such complex area. A figures illustrates its spatial parameters. Figures 4; references: 9 Russian.
[168-6508]

UDC: 55-.328(571.63)

BOUNDARIES OF EASTERN SIKHOTE-ALIN VOLCANIC BELT BASED ON STATISTICAL MAGNETIC FIELD ANALYSIS

Novosibirsk TIKHOKEANSKAYA GEOLOGIYA in Russian No 5, Sep-Oct 84
(manuscript received 11 Apr 83) pp 82-85

KORTUNOV, V. A., KULINICH, R. G., MOSKVICHET, V. S. and PLATUNOV, V. I., Far Eastern Polytechnic Institute, Vladivostok

[Abstract] An attempt was made to utilize magnetometry in the solution of some problems of geocartography, based on statistical analysis of the anomalous magnetic field. Results were analyzed from aeromagnetic surveying within the continental portion of Primor'ye, plus a hydromagnetic survey of the shelf zone of the Sea of Japan. Primary attention was given to spectral and autocorrelation analysis of the anomalous magnetic field. The properties of the field were determined to be a random function in these areas. Some specifics of the geological structure of the territory can be learned from the major features of the structures of the field. The distribution of spectral and autocorrelation parameters of the field is stable or identical for areas of the crust with similar geological structure. Some reduction is observed in energy density of the magnetic field along the hydromagnetic measurement lines, probably as a result of increasing distance of the anomalous sources due to the intervening mass of water and, possibly, sedimentary deposits. Figures 5; references: 2 Russian.

[168-6508]

19 June 1985

UDC: 550.83(571.6-18)

DEEP STRUCTURE OF PENZHINO-ANADYR FOLDED ZONE AND EVENSK VOLCANIC ZONE BASED ON GRAVIMETRIC DATA

Novosibirsk TIKHOKEANSKAYA GEOLOGIYA in Russian No 5, Sep-Oct 84
(manuscript received 6 May 83) pp 99-105

FILIMONOV, B. N., POPOVA, O. D., RED'KINA, G. A. and ROMANOVA, Ye. K.,
Sevvostgeologiya Geological Production Association, Central Geophysical
Expedition, Khasyn, Magadan Oblast

[Abstract] Results are presented from geological interpretation of gravimetric data from the Penzhino-Anadyr folded zone of the Okhotsk Late Mesozoic folded area and the Evensk volcanic zone in the Chukotsk volcanic belt. The deep structure of the areas is analyzed on the basis of geological interpretation of geophysical data. The major elements of the anomalous gravitational field in the area are three bands of positive residual gravitational anomalies with areas of 500-3,000 km². The two zones studied are parts of a large tectonic structure, the Albian-Cenomanian island arc extending 2,000 km from Okhotsk to the upper regions of the Belaya River, a tributary of the Anadyr. The center of the Okhotsk-Chukotsk volcanic belt is related to this island arc system. The direction of tectonic movements and distribution of magmatic formations are determined by regularities of the evolution of the ancient island arc in this area. Figures 3; references: 5 Russian.

[168-6508]

PHYSICS OF ATMOSPHERE

HIGH-ELEVATION STATION'S COSMIC-RAY RECORDING SYSTEM

Moscow IZVESTIYA in Russian 5 Apr 85 p 3

[Text] Scientists of the high-elevation cosmic-ray station of the Kazakh Academy of Sciences' Institute of High-Energy Physics have begun their first experiments for recording cosmic particles with a new automated system, the "Adron-44".

The "Adron-44" is a unique complex which was developed by physicists of Kazakhstan. It is located at the Tien-Shan High-Elevation Station in the Zailiyskiy Ala-Tau Mountains, at an elevation of 3,400 meters above sea level.

Experiments at the cosmic-ray station will make it possible to obtain new information on processes of the interaction of cosmic-radiation particles with matter.

(A photograph was given showing science associates A. Baygubekov and K. Amanov taking readings from an instrument in the field.)

FTD/SNAP
CSO: 1865/278

VIDEO TERMINAL FOR ANALYZING AERIAL INFRARED PHOTOGRAPHS

Moscow NTR: PROBLEMY I RESHENIYA in Russian 5-18 Mar 85 p 2

[Excerpt] A "Self-Contained Video Information Terminal" (SVIT) has been developed at the USSR Academy of Sciences' Institute of Space Research (IKI) in collaboration with the Kirov Polytechnical Institute.

Equipment and methods which have been developed at IKI for digital processing of images are finding employment in various fields of science and the economy, particularly in the solution of problems of mapping temperature patterns of the Earth's surface and atmosphere.

[A photograph was given showing] a fragment of an infrared 'portrait' of a city that was produced on the screen of the SVIT. Clearly distinguishable against a dark background in this picture are spots of light with different degrees of brightness: a power-and-heating plant with five cooling towers, a heat-transport line running from this plant, and a waste-water discharge channel. Moreover, it can be seen that one of the cooling towers, (the middle one), is not operating. Also "shining" brightly is a large residential building-complex, next to which faint spots of light indicating the location of a separate building are slightly visible.

The SVIT is capable of subdividing an image into 256 digital gradations.

Currently under development are methods for analyzing infrared video information which the Central Experimental and Methodological Geological-Geophysical Expedition has been obtaining in the course of aerial photographing in line with a program for ecological monitoring of cities.

FTD/SNAP
CSO: 1865/328

UDC: 551.510.42:551.521.3

COMPARISON OF SINGLE-PARAMETER STATISTICAL MODEL WITH RESULTS OF ROUND-THE-CLOCK MEASUREMENT OF LIGHT-SCATTERING MATRICES

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 1, Jan 85 (manuscript received 17 May 83) pp 22-31

SVIRIDENKOV, M. A., GORCHAKOV, G. I., ISAKOV, A. A. and SIDOROV, V. N.,
Atmospheric Physics Institute, USSR Academy of Sciences

[Abstract] A statistical model proposed in a previous study is shown to agree with the results of round-the-clock measurements of light scattering over a range of 2 to 50 km. Exceptions include extreme situations such as dust storms. The single-parameter model results from uniform matched transformations of angular variations in scattering matrix components with changes in the visibility range due to two main factors, condensation transformation of the distribution of particles by size and changes in the refractive index, including heterogeneous condensation of volatile vapors, plus changes in the relative contribution of molecular scattering. The statistical model can be corrected for individual data sets by considering the mean particle concentration. At long ranges the model becomes inadequate to the observed variability in light scattering characteristics due to non-condensational processes of transformation of aerosol and the dry aerosol base, leading to significant variations in concentration. Figures 5; tables 1; references: 10 Russian.

[256-6508]

UDC: 551.465.7

IONIC MECHANISM OF EXCHANGE OF ADMIXTURES BETWEEN HYDROSPHERE AND ATMOSPHERE

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA
in Russian Vol 21, No 1, Jan 85 (manuscript received 17 May 83,
after revision 11 Aug 83) pp 32-41

SAVCHENKO, A. V. and SMIRNOV, V. V., Experimental Meteorology Institute

[Abstract] Experiments conducted by the authors are used as the basis for a proposed quantitative model of evaporation which takes into account the microphysical and macrophysical characteristics of an ionogenic solution and the surrounding gas medium. Certain practical applications to real atmospheric processes are discussed. The experiments are based on observations of alteration of the charge exchange spectrum of an evaporated liquid-drop aerosol and changes in polar conductivities of the surrounding air. The possible contribution of the mechanism to transfer of ions in the atmosphere immediately above the ocean, in fog and clouds is studied. Figures 3; references 32: 21 Russian, 11 Western.
[256-6508]

UDC: 551.521.3:535.36

INFLUENCE OF SCATTERING MEDIUM OPTICAL IMAGE QUALITY

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA
in Russian Vol 21, No 1, Jan 85 (manuscript received 12 Apr 83) pp 50-57

VOLNISTOVA, L. P. and DROFA, A. S., Experimental Meteorology Institute

[Abstract] In order to study the influence of the position of a scattering medium on the transfer of an optical image, the authors measured the characteristics determining the quality of visibility of objects at various distances between the scattering layer along the path and the object being observed. Results of the experimental study are presented and factors leading to contradictory results in different works are analyzed. The nonmonotonic variation in frequency-contrast characteristics of a thin scattering layer as a function of the position of the layer on a path observed in previous studies results from limitation of the interval of observation angles of the test image. Improvement in the quality of visibility through a scattering layer as the layer is moved toward the opposite end of the sighting path observed in an earlier study can be attributed to changes in the criterion used to evaluate image quality. Figures 5; references: 19 Russian.
[256-6508]

19 June 1985

UDC: 551.466.38

DAMPING OF HIGH-FREQUENCY WIND WAVES BY ARTIFICIAL SURFACE-ACTIVE FILMS

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 1, Jan 85 (manuscript received 5 May 83) pp 76-82

YERMAKOV, S. A., PANCHENKO, A. R. and TALIPOVA, T. G., Applied Physics
Institute, USSR Academy of Sciences

[Abstract] Field experiments with artificial slicks made of surface-active agents have shown that in areas covered by such films the intensity of wind waves decreases greatly over a broad frequency range. This article studies the damping of high-frequency wind waves in small artificial slicks on the order of ten meters in diameter. Experiments were performed in October 1982 along the Black Sea coast from an oceanographic platform with winds of up to about 6 m/s. A resistance-type string wave recorder was used to measure wave heights. The high-frequency (over 2-3 Hz) component of wind waves was sharply reduced by the artificial surface-active slick. With very weak winds, the contrast in the high-frequency portion of the spectrum is well described by a theoretical curve in which the major factor involved is the effect of direct dissipation of surface waves resulting from the presence of the elastic surface-active film. As wind speed increases to about 6 m/s the mean contrast in the gravity-capillary range of frequencies monotonically approaches 1, that is the damping effect of the film decreases. Figures 5; references 12: 7 Russian, 5 Western.

[256-6508]

UDC: 543.064+550.41:550.47

ORGANIC COMPONENTS IN ATMOSPHERE IN REGIONS OF VOLCANIC ACTIVITY

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 1, Jan 85
(manuscript received 4 Jul 84) pp 223-227

ISIDOROV, V. A. and ZENKEVICH, I. G., Leningrad State University
imeni A. A. Zhdanov

[Abstract] Model experiments and thermodynamic calculations indicate the possibility of formation of a broad range of volatile organic components in volcanic processes. In September and October 1983 the authors sampled the air in the region of active volcanoes on Kunashir Island, performing mass spectrometric and gas chromatographic analysis. Fifty-eight organic compounds detected in the air samples are listed. Benzene was present in the greatest quantity. The analyses agreed with model experiments involving abiogenic synthesis of organic compounds under conditions simulating volcanic activity and indicate the presence of natural sources of fluorochlorohydrocarbons which must be considered in estimating the influence of halogen-containing organic compounds on the status of the earth's ozone layer.

Tables 2; references 15: 5 Russian, 10 Western.

[229-6508]

UDC 551.510.522:551.466.31

EVALUATING INFLUENCE OF WAVES ON DYNAMIC STRUCTURE OF ATMOSPHERIC NEAR-WATER LAYER

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian Vol 20, No 12, Dec 84 (manuscript received 6 May 82, after revision 10 Apr 84) pp 1183-1188

YEGOROV, K. L., Leningrad Hydrometeorological Institute

[Abstract] At present there are no convincing experimental data making it possible to draw conclusions on the quantitative influence of waves on meteorological parameters. Many different studies have given contradictory data and conclusions on this subject. Due to this ambiguity the author has sought a possible clarification by an analysis of the possible qualitative influence of the wave-covered ocean surface on the vertical profile of the characteristics of turbulence at the interface on the basis of known hypotheses of the semiempirical theory of turbulence. Specifically, on the basis of solution of the equation for the balance of turbulent energy a study is made of the stationary turbulence regime in a flow with a velocity shear near the wave-covered surface, taking into account the diffusion of the kinetic energy of turbulence from the wave layer in the case of a neutral stratification. The solution is analyzed using a generalized Karman model for the mixing path. This gives evidence of the possibility of existence of conditions characterized by a decrease in the turbulence coefficient with increasing distance from the surface (this is in agreement with some published data). Finally, the computed wind velocity field is compared with observational data. It is shown that the peculiarities observed in structure of the atmospheric near-water layer can be qualitatively correctly taken into account by setting boundary conditions different from conditions over the land and assuming an exchange of turbulent energy between the wave layer and the air flow. Figures 2; references 16: 12 Russian, 4 Western.

[235-5303]

UDC 629.195:551.521

GLOBAL MODELING OF OPTICAL CHARACTERISTICS OF ATMOSPHERIC AEROSOL

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 5, Feb 85 (manuscript received 6 Jun 84) pp 1090-1093

KONDRAT'YEV, K. Ya., academician, MOSKALENKO, N. I., SKVORTSOVA, S. Ya., ZAKIROVA, A. R., YAKUPOVA, F. S. and GUSEV, S. V.

[Abstract] A system for the global modeling of the optical characteristics (OC) of atmospheric aerosol (AA) is proposed. The global structural model of AA is based on a map of the earth's natural landscapes, the temperature

field of the underlying surface or the temperature of the surface air layer and the zonal and meridional components of wind velocity. At the basis of the model are the background aerosol, "floating" in altitude and latitude, and disturbed layers of the zone of active turbulent heat exchange (ZATHE), "banded" transport of the dust aerosol of the middle troposphere and volcanic stratospheric aerosol. The following are defined in the vertical structure of AA: boundary zone of surface atmospheric haze with a thickness of 0-70 km in which there are considerable diurnal variations in the density of AA and the volumetric concentration of particles usually decreases with altitude; a layer of active turbulent exchange with an AA concentration which is constant in altitude and whose upper boundary z_2 varies in a wide range (the lower limit of z_2 values is limited by the height of the surface boundary zone z_1); the middle troposphere layer $z_2 - z_3$ with a sharp drop in aerosol concentration to the background level; the layer of upper troposphere background aerosol ($z_3 - z_4$), the layer of stratospheric (volcanic) aerosol ($z_4 - z_5$) (the maximum of particle concentration in which corresponds to altitudes 22-26 km in the equatorial region and 17-18 km in the polar regions). The model is analyzed. For example, the ZATHE z_2 altitude is dependent on the energy of turbulent heat exchange over the underlying surface or the heat influx to the underlying surface - troposphere system;; the z_2 altitude is determined by the type of underlying surface and the mean daily air temperature at the underlying surface. Roughly speaking, the global monitoring of OC of AA is possible on the assumption that the optical density of AA over the land in the ZATHE zone is constant. Over the sea surface allowance must be made for the effect of wind velocity on the vertical profile of optical density in the ZATHE. Optical models of AA can be based on a data bank of OC for different AA fractions with different microstructure and chemical composition. The modeling of OC of AA revealed that the greatest optical thickness of AA is observed at the hottest time of the year and in the warmest zones when the ZATHE altitude attains 4 km and the optical thickness of AA is $\approx 0.3-0.4$. The most transparent atmosphere is in the cold season (polar regions) when ZATHE altitude is minimum and the optical thickness decreases to 0.01-0.03. The density of background aerosol also correlates with ZATHE temperature. Figures 3; references: 3 Russian.

[266-5303]

UDC 551.510.42

DIURNAL VARIATION OF OPTICAL AND MICROPHYSICAL CHARACTERISTICS OF NEAR-SURFACE AEROSOL

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 20, No 12, Dec 84 (manuscript received 17 May 83, after revision 22 Nov 83)
pp 1156-1164

SIDOROV, V. N., GORCHAKOV, G. I., YEMILENKO, A. S. and SVIRIDENKOV, M. A.,
Atmospheric Physics Institute, USSR Academy of Sciences

[Abstract] The article gives data on the mean diurnal variation of the coefficient of light scattering σ , the scattering coefficient σ_{dry} for the dry base of aerosol and microstructural parameters obtained by the inversion of optical information. The study was based on data from around-the-clock measurements of the four components of the light scattering matrix D_{11} , D_{21} , D_{33} and D_{43} for five fixed scattering angles in the range $15-165^\circ$ (wavelength of light $\lambda = 0.55 \mu\text{m}$). It was found that the principal features of the diurnal variation of the parameters of optically active aerosol are determined by its condensational transformation with a change in relative humidity and by local processes of accumulation and elimination of aerosol, whose relative role and effectiveness change over the course of a 24-hour period. The accumulation of the mass of dry aerosol matter under nighttime conditions is associated primarily with the growth of particles, but during the daytime a significant role is played by processes resulting in an increase in the concentration of the submicron aerosol. The cyclicity in the change in total content of optically active aerosol in the surface layer, in combination with a clearly expressed dependence of its parameters on relative humidity and the effectiveness of vertical mixing, are indicative of a possibility for predicting the state of aerosol within the framework of a local synoptic forecast. Figures 3; tables 1; references 17: 15 Russian, 2 Western.
[235-5303]

NEW TEAM FOR SP-27 ARCTIC DRIFTING STATION

Leningrad LENINGRADSKAYA PRAVDA in Russian 18 Apr 85 p 4

[Article by N. Osipov]

[Text] A group of polar explorers of a new replacement contingent for the drifting station "Severnnyy Polyus-27" (SP-27) took off from Leningrad for the Arctic yesterday. The group is headed by V. S. Rachkov, science associate of the Arctic and Antarctic Institute and an Experience polar researcher.

The new expedition will devote much attention to questions of conserving the biological resources of areas of the Far North and safeguarding human health.

The ice floe on which "SP-27" will drift is now located approximately 500 kilometers to the north of the New Siberian Islands.

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